A Database Publication

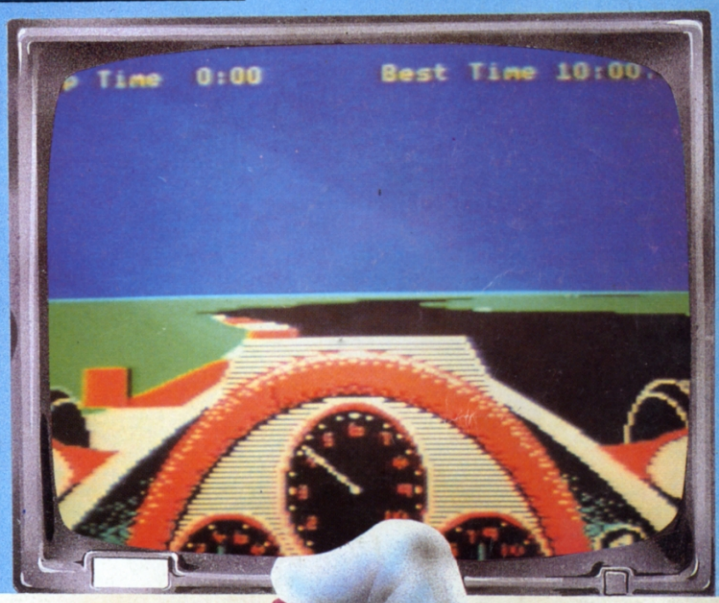
THE MICRO USER

Volume 4
Number 1
March 1986
£1.25

THE NEW MICRO'S SECRETS REVEALED

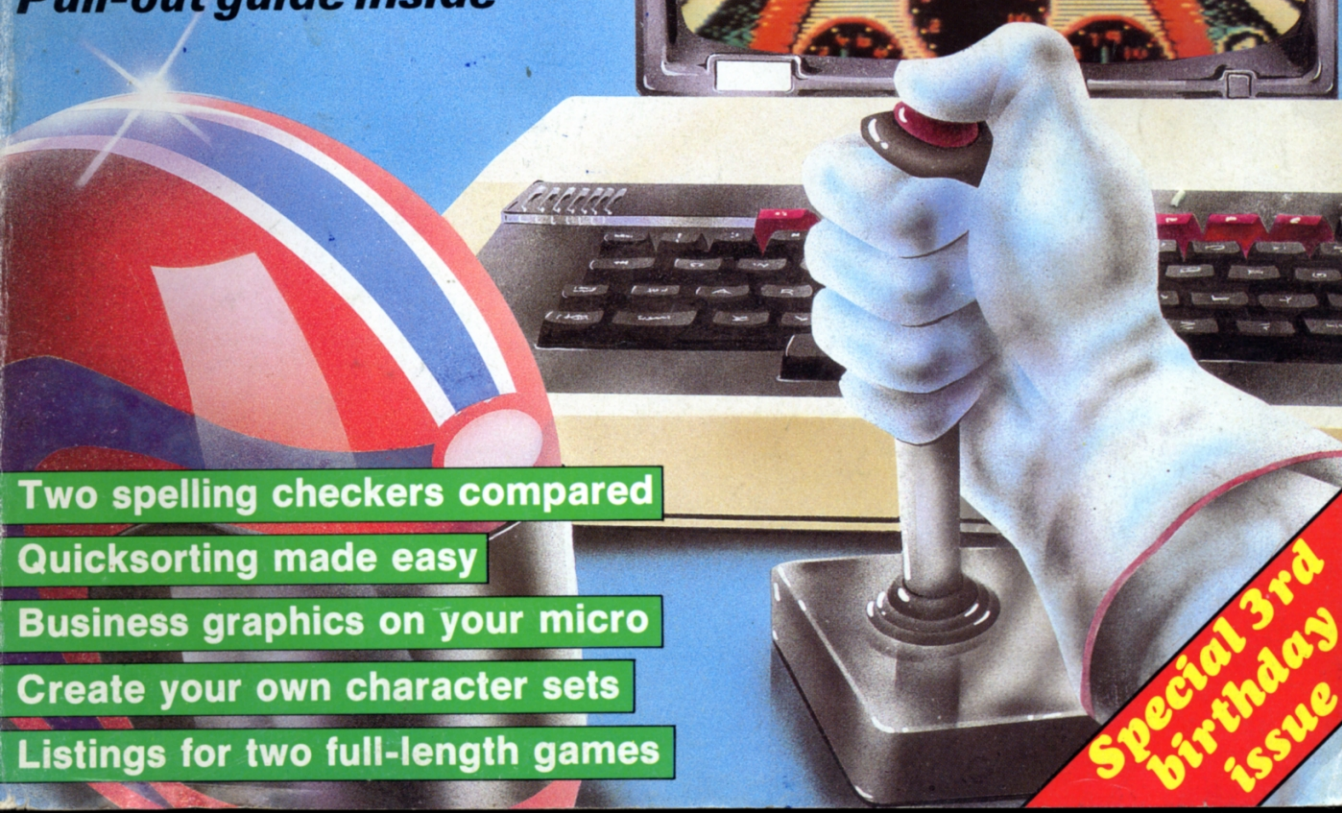
Expert hands-on evaluation of the BBC Master

Top-selling guide to the BBC Micro!



How to beat the best at Silverstone

Pull-out guide inside



Two spelling checkers compared

Quicksorting made easy

Business graphics on your micro

Create your own character sets

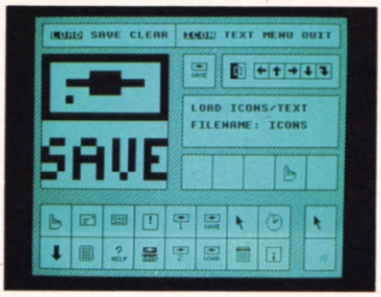
Listings for two full-length games

Special 3rd birthday issue

ICON MASTER — Icon Control System

GIVE YOUR PROGRAMS THAT PROFESSIONAL TOUCH

This pack automates the creation of an icon-driven user interface. It is supplied on a 16K Rom and allows you to design a screen containing icons and then use it in your own programs, in place of a normal menu.



It is easy to use and may optionally be controlled with the AMX mouse. Icons (sample sets provided) are designed on a special Icon screen editor and are compatible with AMX icons.

Having designed the icons, the next step is to select the Menu editor and design your final screen. You may position your icons and text wherever you choose on the screen. Icon Master then generates the code to append to your Basic program which will reproduce your icon screen and handle user input.

Your own icon-driven programs may be used with or without the Icon Master Rom in your machine.

ROMIT — Put your own Basic programs into Rom

CREATE YOUR OWN SILICON DISC

RomIt is a 16K Rom which adds a new feature to your BBC Micro — A Ram Filing System. This provides over 20 new commands which enable you to:

1. Create a silicon disc with its own filing system commands. Type ★RAM, then you can catalogue the 'disc', save and load files to it, storing as many files as memory will allow. You will need sideways Ram to use this facility.

2. Put your own Basic or assembler programs (or any file) into Ram and then make them into Eproms. Whether it's your favourite game, your function key definitions or any program that you use frequently, you can now put it into Eprom so that it's always instantly available.

Your Eproms will work with or without the RomIt chip in your machine, and so you may pass on copies of your programs to other people.

Getting your own Basic program into Rom couldn't be simpler. Just load your program into memory and type: **★RAM ★TRANSFER "prog" ★DOWNLOAD** and either connect it to a blower, or send the disc (or tape) to us, together with your RomIt registration number, and we will Rom it for you. (There is a small charge for this service).

3. Use your sideways Ram as a printer buffer so that you can continue to use your computer for other work at the same time as printing long documents.

Over 20 new ★commands are provided by RomIt

To get the most from RomIt you will need sideways Ram fitted to your computer, eg just a single Ram chip plugged into your ATPL (or other) Rom board.

ICONMASTER £34.00 ROMIT £34.00 inc. VAT

Available from your local dealer. **Supplied on 16K Rom.**

For further information: Tel St. Albans (0727) 40303

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BEEBUG SOFT

BEEBUGSOFT

We thought it was about time we put you in the picture.

AMX Mouse is compatible with all six modules of **Mini Office II**

Word Processor • Database • Spreadsheet
Graphics • Communications • Label Printer

When we introduced our AMX Mouse to BBC Micro users, the response was phenomenal.

And no wonder!

It was regarded as 'pushing the BBC to its limits' and hailed by the press as 'probably the best input device that has appeared recently'. The AMX Mouse brought to BBC Micro users the same sophisticated, positive control that had, until then, been the province of the more expensive computers, like the Macintosh.

Now we announce a new enhanced software package which, can be used with a traditional keyboard or joystick but truly comes into its own when used with the AMX Mouse.

AMX Super ROM and Super Art adds colour to the features of the original AMX ROM, on a new 16K ROM.

It dramatically extends the original AMX ROM facilities to include Pull Down Menus, over lapping colour windows, colour patterns and an extended Icon set in all graphic modes.

Specially written to be usable with the vast majority of BBC Systems including 2nd processors, the Aries RAM Board, the BBC + Shadow mode, tape, DFS and ADFS.

The kernel of the Super Art program is included in the 16K ROM, providing tape and disc users with a Mode 1 colour drawing program.

But Super Art really comes into its own when used on a disc based system; a host of additional facilities can be selected direct from the screen.

Colour pictures can be created in dot resolution up to A4 size by scrolling the screen window, over the picture.

Other facilities include colour pattern editing – use of icons, additional text styles, various copy facilities and a superb colour Zoom.

Pictures can be printed out in colour (Integrex) or shades of black and grey on Epson compatible printers.

The results can be astonishing! – you can even store your finished 'masterpieces'.

The AMX Icon Designer facility gives you further freedom to design and store your own custom icons for use in your own programs.

This fabulous new package costs only £89.95 – a price as remarkable as the package itself – and includes a fully illustrated operating manual.

If, however, you are afraid of mice, you can purchase just the software package plus the 16K Super ROM for just £49.95.

You will still achieve some pretty remarkable results using your keyboard or joystick – not nearly as good as with the Mouse of course – but you can always add one later on for just £40.

Then you'll really be 'in the picture'.

AMX MOUSE

IMAGINATION AT YOUR FINGERTIPS.

BOTH THESE EXCITING PACKAGES ALONG WITH OUR SUPERB RANGE OF AMX ROM AND SUPER ROM COMPATIBLE SOFTWARE ARE AVAILABLE FROM ALL GOOD COMPUTER DEALERS OR BY SENDING CHEQUE OR P.O. TO FREEPOST ADVANCED MEMORY SYSTEMS LTD., 166-170 WILDERSPOOL CAUSEWAY, WARRINGTON, WA4 6QA.
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Vol. 4 No. 1 March 1986

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Quoting Ref. MAG001.
Prestel Mailbox: 614568383.

Published by:
Database Publications Ltd,
Europa House, 68 Chester Road,
Hazel Grove, Stockport SK7 5NY.

Subscription rates for 12 issues, post free:

£15 – UK & Eire (Sterling only)
£40 – Europe
£52 – Rest of world (airmail)

ABC **64,956** January-June 1985

The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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News trade distribution:
Europress Sales and Distribution Limited, 11 Brighton Road, Crawley, West Sussex RH10 6AF. Circulation 0293 27053.

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Our 3rd birthday offers

Don't miss our bargain bundles of tapes and discs at throwaway prices – plus a really incredible offer of an ink-jet printer for £49 and the BBC Micro Teletext System for £69.95.

They're all in our Special Offers section starting on Page 167.

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The part of the magazine you write yourselves – your news, views, brainwaves and moans.

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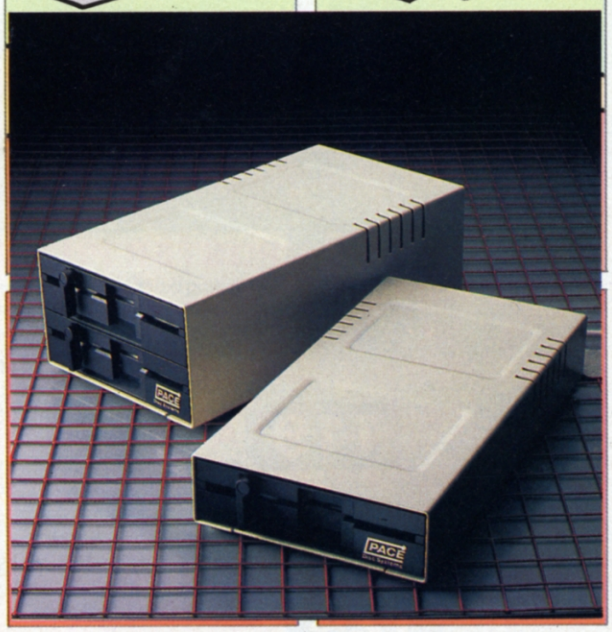
PACE
Micro Technology

PEAK OF PERFECTION



When you give your BBC computer a Pace disc drive, you give yourself much more.

More time, More confidence, More flexibility, and more importantly, Peace of mind.

A quality disc drive from Pace will give you the freedom to use your BBC the way you want to use it. Why be dictated to by the speed of a "Data Recorder" when all your programs and data can be loaded and saved in less than a tenth of the time with discs. You will very quickly become dependent on your drive.

At Pace Microtechnology we realise just how important your drives will become so we build them to last. Each unit has a die-cast alloy chassis for rigidity and long-term stability. They use direct drive brushless DC motors for accurate speed control and LSI technology for high reliability with low power consumption. The heads are long-life ceramic.

But the quality doesn't stop with the mechanism. The cases are functional yet attractive enamelled aluminium. Only the highest quality data cables are used and each drive is individually tested before and after building. Our after-sales service is second-to-none.

Quite simply, what more could you want?

For further information call us on 0274 729306 or write to the address below.

NEW Self-powered Pace drives

With the addition to our range of self-powered drives, we now have the largest range of drives available for the BBC.

Single drives. Dual drives. Single drives in dual cases (for simple upgrading). Drives with power supplies. Drives which use the BBC auxiliary power socket. 40/80 track switchable drives.

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Bradford BD15 7AG
Telephone 0274 488211
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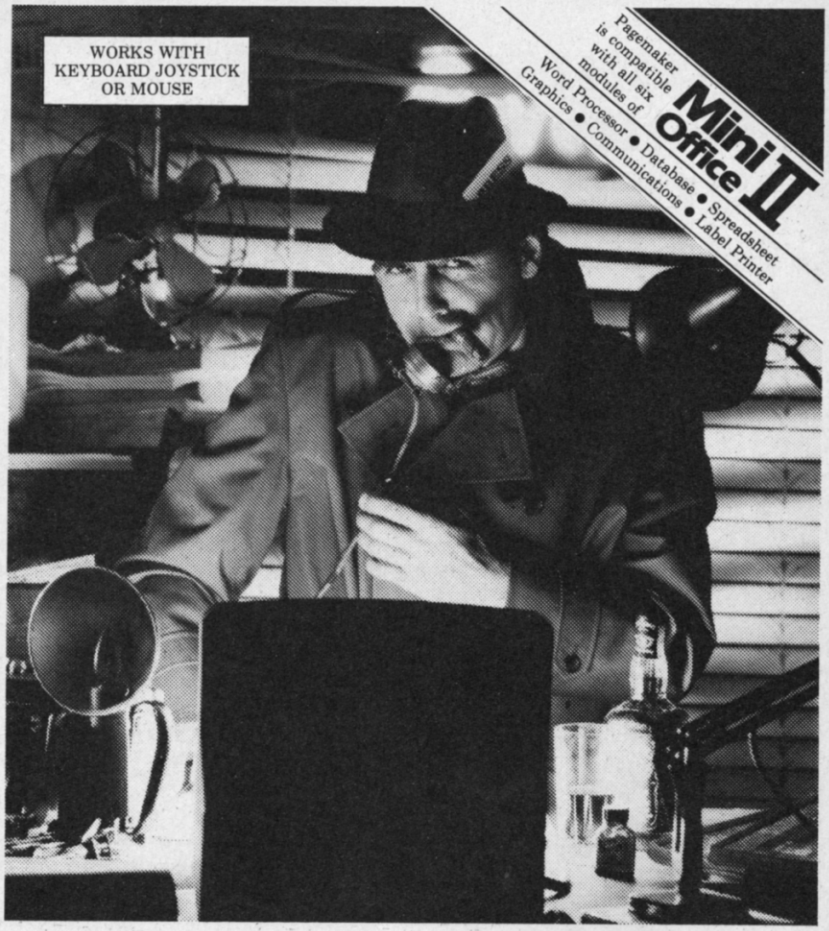
When the press use such words as 'Phenomenal', 'Outstanding', 'Ideal' and 'Worth Every Penny', they've obviously discovered something rather special.

But when that something turns out to be a product in which they are already expert, then it must be something very special indeed. The object of their enthusiasm is AMX Pagemaker – a revolutionary software program that will produce newspapers, posters, leaflets, notices and hand-outs – in fact anything where text and graphics are required, to an extraordinary professional standard.

It's a complete graphics design system and word processor rolled into one.

AMX Pagemaker consists of two Roms and two discs therefore it will work on a standard BBC or B+ micro without a Rom board.

AMX Pagemaker is fully compatible with either the AMX Mouse – joystick or keyboard and requires the minimum of a single 40 track disc drive. It has real time graphics with fast continuous scrolling up and down an A4 page and uses Mode 0, the highest graphics resolution on the BBC.



The program that's making front page news.

READ ALL ABOUT IT.

You can type directly on to the screen, with any of the 16 typefaces supplied or design your own, alternatively, you can load in wordwise and view files with fully automatic on screen text formating as they load. Either way centering, ragged right and literal justification are all available. There is full pixel resolution control over character size and spacing: Also included is a Micro justification facility.

EXTRA, EXTRA.

There are outstanding facilities for drawing, spraying and painting, using either the patterns supplied, or your own pattern designs, enabling you to achieve some incredible graphic results. A complete Mode conversion program is included allowing you to load in drawings and digitised pictures from all BBC graphic modes. The cut and paste facilities include: copying, moving, rotating, stretching and a fantastic zoom is also available.

The previewer allows you to view three A4 pages at any time, before work is output to a wide range of dot matrix printers including: Epson FX/RX/LX/LQ, Canon PW-1080, Kaga KP810, Mannesman Tally MT-80+, Seikosha SP-1000A, Star Delta, Star SG10. And any that are compatible with the above.

AMX Pagemaker is your opportunity to join the publishing revolution, it comes complete with a comprehensive manual which the press describes as 'Superb'.

At only £49.95 the cost of the Pagemaker is as amazing as the program itself.

Let's leave the last word to the press.

*"Pagemaker" is phenomenal – it lends itself to creating anything where text and graphics are involved – notices, posters, leaflets, hand-outs, newsheets. Packages like this have been the province of the 16 – bit micros until now, this product is worth every penny of £49.95."

* 'Educational Computing', January 1986.

This superb package is available from all good computer dealers or direct using the Freepost order form below.

PLEASE RUSH ME POST FREE _____(Quantity) AMX PAGEMAKER PACKAGE/S AT £49.95 EACH INCLUDING VAT AND P & P.
I ENCLOSE CHEQUE/POSTAL ORDER FOR £_____ OR DEBIT MY

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SOLIDISK FOUR MEG BOARDS MAKE THE BBC MICRO ONE OF THE FASTEST MACHINES YOU CAN BUY

Fit your BBC micro with a Solidisk Four Meg board, and run the PCW BASIC benchmarks in 7.13 seconds, and the PCW Spreadsheet benchmark (with Inter-Sheet) at 312 cells/second.

If you are serious about your business throughput or your "Elite" status, check the effect of Solidisk Four Meg boards. They use a totally new concept for expanding your BBC micro, both in RAM/ROM capacity and in speed.

The newer ROMs have more capacity, 32k as used in the BBC Plus and 64k as in the Communicator. They are also faster and consume far less power than the older 16k and 8k ROMs.

There are four high-capacity Sideways ROM sockets on a Solidisk Four Meg board. You can use a 64k chip in one of them and 32k chips in the other three. Together with the four ROM sockets on the BBC motherboard, you can then fit up to 224k of Sideways ROM into your BBC computer.

Sideways RAM and Shadow RAM haven't been forgotten. The Solidisk Four Meg board can have them too. You can choose either zero or 32k of RAM. The latter can be used either as Shadow RAM or as two banks of Sideways RAM.

Thus, the Solidisk Four Meg boards offer more capacity and yet occupy less space than other boards offering only Sideways ROM/RAM expansion.

In addition, the new Solidisk 256k board offers the Four Meg feature, together with up to eight banks of Shadow RAM and eight banks of Sideways RAM.

But the real plus feature is speed. The Solidisk Four Meg boards make the BBC micro outstandingly fast.

They have a switchable 2 or 4 MegaHertz superfast CMOS 6502 processor. At 4 MHz, the machine can produce up to twice the throughput of a standard BBC B, BBC Plus 64k or BBC Plus 128k. Witness the PCW BASIC and Spreadsheet benchmarks.

Compared with a standard IBM-PC (17.6 sec) and a standard BBC micro (14.6 sec), a Solidisk Four Meg board enables the BBC to run the BASIC benchmark in just 7.13 seconds, putting it amongst the fastest micros that you can buy today.

It is comfortably ahead of a BBC with the Acorn 6502 Second Processor (9.58 sec), and only marginally slower than an IBM-PC AT (TM) (7.11 sec) and a BBC with the Acorn 32016 Cambridge Co-Processor (6.88 sec).

Using Computer Concepts Intersheet to run the Spreadsheet benchmark for speed of recalculation, the Solidisk Four Meg boards enable the BBC to achieve the highest published score amongst microcomputers: it can recalculate more than 24 rows × 13 columns per second (312 cells/sec) by comparison with LOTUS 1-2-3 (89 cells/sec.) or even SYMPHONY (TM) on the IBM-PC (97 cells/sec).

Besides serious applications, the Solidisk Four Meg boards are simply great for computer games. You should just see the stunning graphics and response at 4MHz to realise how good your BBC Micro is. If you don't believe us,

Just try Acornsoft's Elite or Revs with it!

IBM-PC AT is registered trademark of IBM Corp.
1-2-3 and Symphony are registered trademarks of Lotus Development Corp.
SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL SOUTHEND-ON-SEA (0702) 354674.

The

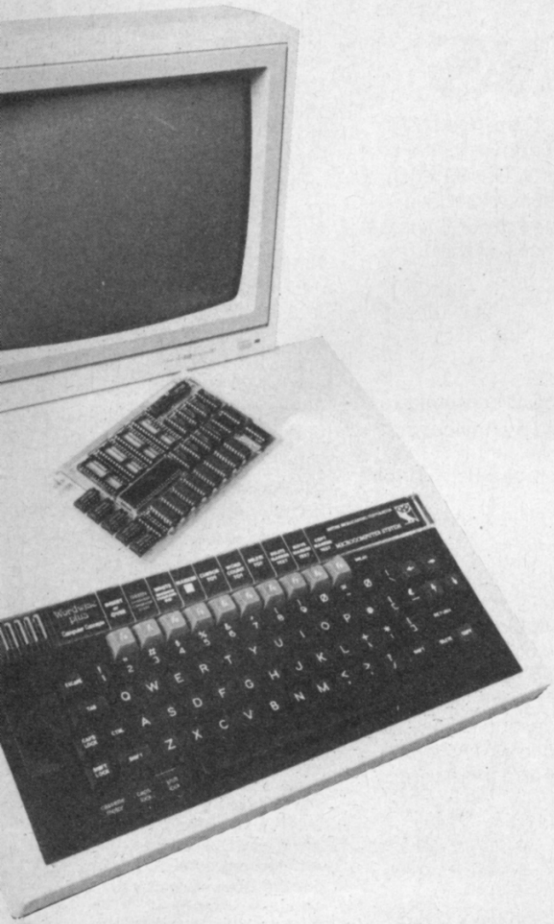
The basic Four Meg board costs £30.00 inclusive of VAT.

The 32k version comes with software in ROM and on 5 diskettes, and costs £69.00 inclusive of VAT.

The Solidisk Four Meg boards are intended for the BBC Model B only and can be used with existing Solidisk Sideways RAM boards. However, they are not compatible with any other Sideways RAM/ROM boards, or Shadow RAM boards — which they can replace.

The Solidisk Four Meg boards are securely mounted on the original processor socket, and the additional connections may be made either by sprung clips or by soldering.

The sideways ROMs and RAMs built onto the BBC motherboard are not switchable to 4 MHz.



Solidisk 256K Board

Largest and fastest in the range of memory upgrades for the BBC computer is the Solidisk 256k board. This has 256k of RAM, four high-capacity ROM sockets and a superfast 4 MHz 6502 processor. Both the 256k of RAM and the four ROM sockets can run either at 2, or at 4 MHz — twice the speed of the standard BBC B or the B Plus.

It comes with Wordwise Plus, the best-selling wordprocessor from Computer Concepts, and the Solidisk 32k Manager ROM. This latter can allocate the RAM between Shadow RAM, which acts like that on the BBC Plus, Sideways RAM, for holding images of ROM software, and a RAM disc, which can be of up to 200k.

The Hardware

The 256k RAM is divided into eight banks of 32k bytes, which can each be used as Sideways RAM or as Shadow RAM.

Shadow RAM is usually 20k, but may be increased to 30k, to enlarge the RAM available to the user — eg to hold a bigger document or worksheet.

Sideways RAM is usually 16k, but can be 31k to increase the amount of code held in a single bank. Software which occupies two ROM slots in a standard machine may now be re-written into a single ROM slot, thus becoming shorter in size and faster in operation.

If need be, each bank can be shared between the two, i.e. the bottom as Shadow and the top as Sideways RAM, the border line being controlled by the application software.

The four high-capacity ROM sockets on the 256k board can accept chips of any size from 8 to 64k. 32k chips can be configured either as 31k of continuous code or two independent levels of 16k; "resident" and "backup" (this latter being compatible with the BBC Plus). 64k chips can be divided similarly; one resident — again of either 16 or 31k — and the rest as backups.

The processor is switchable between 2 and 4 MHz. At 4 MHz, the machine can produce up to twice the throughput of a standard BBC B, or B Plus, 64 or 128k.

The Manager ROM

This enables the 256k RAM board to be used for VDU screen record/playback, printer/sound buffer, Basic variable storage, or as a RAM disk.

The Manager ROM also contains a toolkit of programming utilities to list variables, edit, find and exchange strings, check, move, salvage, expand, join and renumber programs, load, save and set function keys, report program status, turn cursor and sound on/off, set sound volume etc.

Shadow RAM may be selected by *SHADOW, followed by a mode change, or by FX114, 128 to FX114, 255, exactly as on the BBC B Plus. However on the latter, arguments 128 to 255 all select the same, single Shadow RAM bank, while on the Solidisk 256k board, they can select between up to 128 Shadow RAM banks (if they exist).

As with the earlier Solidisk SWR32, 64 and 128, a group of Sideways RAM banks can be used as a RAM DISC — now of up to 200k. RAM disc is set up by *RAMDISK <drive>. This stimulates a disc drive, now under not only the Solidisk 2.0 DFS but also — for the first time — ADFS. This operates faster than even the Solidisk Winchester.

The Manager ROM makes the 256k board even more versatile. RCAT displays both "resident" and "backup" firmware. Resident firmware includes all ROMs installed in the BBC motherboard, plus all Sideways RAM banks containing ROM images. The command SELECT causes code to be copied from a backup to a Sideways RAM bank, thus making it "resident".

These features provide potential for further developments in software for the BBC Micro — including integrated suites of business applications, such as Computer Concepts' "Inter-" family.

With the most useful RAM capacity, and the doubled speed, the Solidisk 256k board is perfect for the present, while having huge potential for the future.

Prices, inclusive of VAT

The 256k board comes with the Wordwise Plus ROM and manuals, and Solidisk Manager ROM and manual.

Outright	£175.00
Upgrade from SWR 32	£123.00
Upgrade from SWR 64	£89.00
Upgrade from SWR128	£75.00

The 256k boards are securely mounted on the original processor socket, and the additional connections may be made either by sprung clips or by soldering.

THE SOLIDISK - DISC SOLUTIONS

Solidisk can offer you the widest possible choice in hardware and in software. Our 1770 and 1770+8271 disc interfaces are of the finest design, and supported by excellent software. Solidisk DFS and ADFS are highly acclaimed by BBC experts. Our 80-track double-sided floppy disc and high-capacity Winchester drives are the fastest and have the lowest power consumption. The quality of support and the competence of our 90+Local Experts and technicians are unquestionable. So when you shop around, insist on the Solidisk label.

The Solidisk 1770 Disk Interface

The Solidisk 1770 Double Density Disk Interface enables the standard BBC B computer to use floppy disc drives. It has only four components, which are easily fitted by novice and expert alike.
The Solidisk 1770 Double-Density Disc Upgrade (Issue 2) is now fully compatible with the Acorn 1770 DNFS and the Acorn ADFS ROMs.

The Solidisk 1770+8271 Disc Interface

In order to enjoy double density operation, as well as retaining maximum software compatibility with older disc software (which only runs with the 8271), you can now fit the Solidisk 1770+8271 Disc Interface. You can select either the 8271 or the 1770 at a flick of a switch.
It is intended for the BBC Model B already fitted with an 8271 Disc Upgrade, and plugs into the 8271 socket, with the 8271 being transferred to the new board. The Solidisk 1770+8271 Disc Interface (Issue 2) is now fully compatible with the Acorn 1770 DNFS and the Acorn ADFS ROMs.

The Solidisk 2.0 Disc Filing System ROM

This ROM can be used with either 8271 or 1770 Disc Interfaces (Acorn or Solidisk). It has every facility that you would expect, such as disc formatter and verifier, automatic 40/80 track switching, single/double density sensing and programmable track stepping (to suit almost any type of disc drive).
Additional features and utilities include unlimited file catalogue, Read-After-Write (for higher reliability), text editor, memory editor, disc sector editor, whole disc copier, tape-to-disc, download, read and write a track and recover and restore sectors (for recovering corrupted discs).
Even when working with the 1770, it can run all Acornsoft games (such as Aviator, Elite, Revs, Magic Mushroom etc), and most other protected disks (such as Castle Quest, Island's Music System etc.).
It also has several advantages over the Acorn 1770 DNFS ROM including:
1) The option of double-density operation, which gives 60% more storage capacity, i.e. 640k on a double-sided 80-track diskette, as opposed to only 400k.
2) A better emulation of the older 8271 floppy disk controller: some protected disks (such as the early versions of Acornsoft's Elite game will not run with the Acorn 1770 DFS.

These features make the Solidisk 2.0 ROM the most versatile DFS software you can buy.

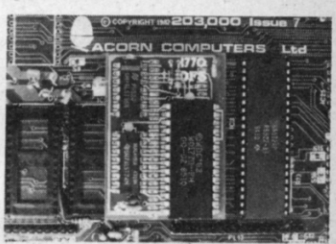
The Solidisk Advanced Disc Filing System ROM

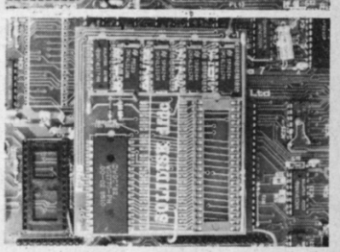
This ROM-set can be used on the BBC Plus and the BBC Model B fitted with a 1770 Disc Interface (Acorn or Solidisk). It is available as an upgrade for your existing DFS ROM in one 32k or two 16k ROMs.
The Solidisk ADFS was reviewed in A & B Computing, October 1985. Whilst comparable to the Acorn ADFS, it is designed for maximum DFS software compatibility (PAGE=& 1900 with one file open).
The Solidisk ADFS will run most software available for the BBC computer, including all Acornsoft languages and the View family and Computer Concepts Wordwise and the Inter-family.
Additional commands include OPEN <number of files> to reset PAGE appropriately, while MVDFS and MVADFS provide direct transfer of files between DFS and ADFS discs.
The Solidisk ADFS is equally convenient for use with floppy and hard discs.
Utilities such as FORM40, FORM80 (for single-sided drives), FORM160 (for double-sided, 80-track drives), VERIFY are provided for floppy discs, whilst BYE used on a hard disc makes a copy of the root directory, to assist recovery in the event of corruption.

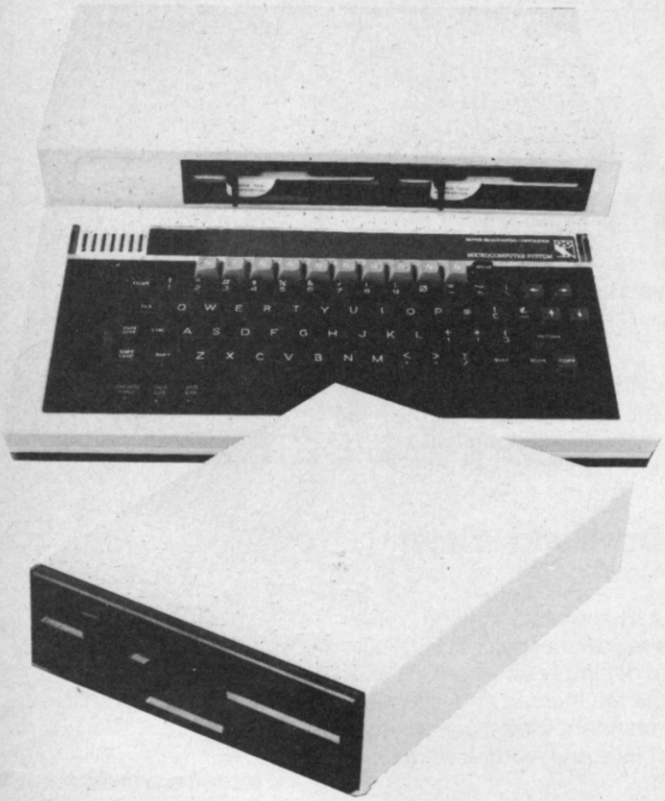
The Advanced Disk Filing System (ADFS) is now officially launched by Acorn, and is already revolutionizing software for the BBC Micro. The Solidisk enhancements make it obviously preferable.

Prices, inclusive of VAT

2.0 DFS ROM and manual	£10.00
ADFS+DFS ROM set and manual	£20.00
Upgrade from 2.0 DFS to ADFS	£10.00
1770 Disc Interface, 2.0 DFS ROM and manual	£45.00
1770 Disc Interface, ADFS, DFS ROMs and manual	£55.00
1770+8271 Disc Interface, 2.0 DFS ROM and manual	£50.00
1770+8271 Disc Interface, ADFS, DFS ROMs and manual	£60.00







Solidisk Disc Drives

Solidisk 5.25 inch disc drives are of the latest half-height design, with 80 tracks and double-sided, giving a capacity of 1 Megabyte (unformatted). Features such as automatic spin-up, steel band positioning and a new head mounting system ensure correct centering, consistent tracking performance and long service life of the disc.

The use of a direct-drive motor and the latest VLSI circuitry results in exceptionally low operating noise and power consumption. Therefore two such drives can be powered reliably by the BBC micro.

They are enclosed in strong steel casings, coloured in elegant beige, to protect the high-precision mechanism. The power and data leads are fitted with appropriate connectors, to suit the BBC computer.

With each disk drive purchase, Solidisk provide five volumes of useful software, each on a separate diskette, and a User Manual.

Volume 1

Solidisk Word Processor and Spelling Checker, with English dictionary. You enter by *WP <filename>, and then start typing. Wordstar-like commands make it easier to use than Wordwise, View or Scribe. What you see on the screen is what will be printed. The most useful commands are displayed at the top of the 80 column screen. It provides on-screen justification, automatic margin, insert/overwrite, search and replace, word count, word frequency count, free space, *commands and page numbering. Block operations include move, delete, copy, print, load to cursor. The Solidisk Word Processor has the unusual ability to spellcheck your document without leaving it, simply by typing Control-U.

Volume 2

This contains the Solidisk Database. It uses an 80-column display, is completely menu-driven, can be easily customised and allows datafiles as large as the filing system permits.

You enter the database with Shift-Break, and select one of the 15 options, each leading to a sub-menu. Datafiles can have an unlimited number of records, each with up to 15 fields of up to 60 characters. You can search, sort, view, print using tabulation, print labels, print forms, edit and delete, calculate on fields, merge databases, mailmerge etc.

Volume 3

This contains the Solidisk spreadsheet. Also using 80-column display and menu-driven, it has options to create, edit, recalculate, and print etc. Spreadsheets can have unlimited numbers of rows and columns. Each column can be from 2 to 70 characters wide. All the BBC Basic maths functions are available.

Volume 4

This contains the Solidisk MACRO language. It is Control, TAPE to DISC. DZAP, MZAP and SILEXIGEN, a dictionary generator for the Solidisk Spelling Checker together with a sample French dictionary.

Volume 5

This contains the Solidisk MACRO langauge. It is capable of generating a Basic program using PROCEDUREs, FUNCTIONs, MACROs and machine code routines contained in other programs.

Using the Solidisk MACRO language, you can extract useful parts of existing programs to set up your own MACRO libraries, then use them later on as building blocks for new programs.

The Solidisk computer case

This compact steel case is coloured in beige and especially designed to hold the BBC micro and two Solidisk disc drives. It will support even a heavy-weight monitor, while providing good cooling for the power supply and concealing many connecting cables.

The keyboard is housed in a separate case, connected by a 24 inch flexible data cable. It is ½ inch lower than the original case, does not skid about on the desk and makes a lot of difference to typists (even two-fingered ones!).

Prices, inclusive of VAT

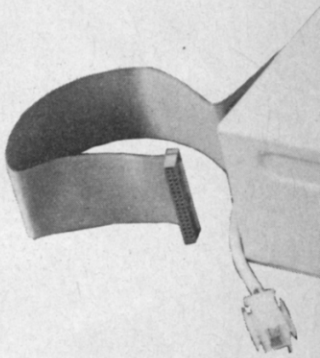
Solidisk 80-track, double-sided disc drive unit with software and manual	£109.00
Dual 80-track, double-sided disc drive unit with computer and separate keyboard cases, software and manual	£230.00
Computer and keyboard case alone	£ 30.00

We reserve the right to change prices and specifications without prior notice.

A COMPLETE SOLUTION TO BUSINESS COMPUTING

Suitably equipped, your BBC Micro is an excellent computer for the office. It can run wordprocessor, database, spreadsheet etc better than many other business machines. It can also communicate with other micros and mainframe computers, either directly or via a MODEM.

Solidisk has selected the best in business software, disc drives and printers to form the Solidisk Office System, based upon the BBC Model B or the B Plus. With the Model B, a Four Meg board or a 256k expansion may be fitted along with a 1770 or a 1770+8271 disc interface. Both models can have a Winchester hard disc connected.



The Solidisk Wordprocessor, Disc Drive and Printer Package

The Wordprocessor is the famous WORDWISE PLUS — the best selling wordprocessor from Computer Concepts. Various reviewers speak of WORDWISE PLUS as very user friendly, flexible, straightforward or simply excellent (1). With it, you can write letters and longer documents, and change them to your satisfaction before printing. If you need many similar letters or standard forms, you need only write them once. Wordwise Plus can search and replace any word or phrase, and also mailmerge.

The 5.25 inch disc drive is of the latest half-height design, with 80-track double-sided, giving a net capacity of 640k bytes per disk (in double density). The diskettes are industry standard, readily available and low in cost. The power and data leads are fitted with appropriate connectors, to suit the BBC computer.

The printer is a 9-needle dot-matrix, with a speed of 160 characters per second in normal mode and 32 characters per second in Near Letter Quality mode. Features include multiple pitch settings, italics, boldface, underline, super and subscript, bit image graphics etc. It uses the same ribbon and control codes as the Epson FX85(2).

All manuals and accessories like printer ribbon, printer cable and paper, and a blank diskette are included, so that you can start right away. The package also contains a list of other selected software and hardware available from Solidisk.

Other possible applications

The Solidisk Office System can do more than just wordprocessing. To complement WORDWISE Plus, five volumes of useful software are provided, each on a separate diskette, including Spelling Checker, Database and Spreadsheet programs. You can use the database for mailing lists, customer records, stock inventories etc and the spreadsheet for cheque book balancing, budgeting and forecasting. The database is powerful enough to do important work such as processing all the Solidisk customer records (over 50,000).

However, you need not be limited to the bundled software, but can easily increase the power of the system with, eg a spreadsheet such as Inter-Sheet, a business graphics such as Inter-Chart, or a database such as Viewstore, for more demanding applications. With this last you can, for example, set up a datafile of 30,000 membership records of a video club and have any or even all fields indexed. You can then display them in sorted order, retrieve any record instantly with a few keystrokes, and have a report printed on most popular titles, age groups, takings etc. Such a large database requires a disc drive of very high capacity which in practice is a Winchester disc. Even if your present needs are not as large as this, it is nice to know that this system can grow tith you.

Prices

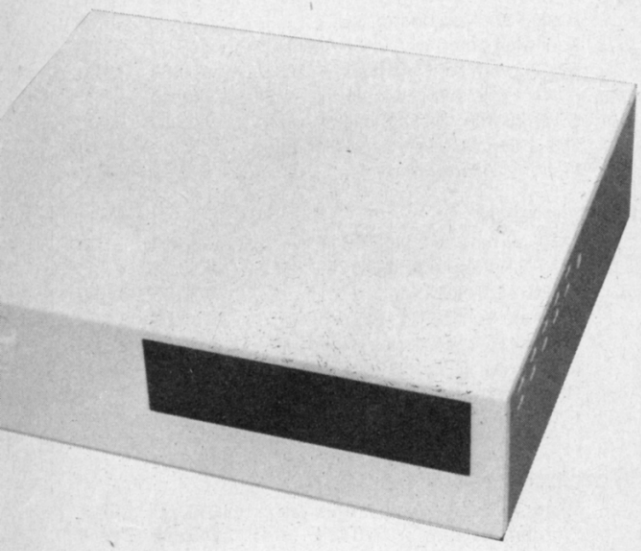
The Wordprocessor, disc drive and printer package is available for the BBC model B Plus or the Model B fitted with disk interface. This includes:

- WORDWISE PLUS ROM, keystrip and manuals.
- one double-sided 80-track disc drive.
- one 160 cps printer.
- five software diskettes and manuals.
- all leads, blank diskette and 100 sheets of fanfold paper.
- one year guarantee.

The complete package costs £269.00 plus VAT.

Owners of BBC Model B's can purchase a Solidisk 1770 disc interface and a 2.0 DFS ROM, together with teh above package, at a special price of only £299.00 plus VAT (saving £10.00).

(1) See reviews in E & CM, CEEFAX, Acorn User.
(2) Solidisk own direct imports from Japan, subject to change without notice for improvements.



THE SOLIDISK WINCHESTER DISC DRIVE

The drive has a capacity of 20 Megabytes formatted. Both single- and dual-drive models are available.

Two key advantages of Winchesters over floppy discs are higher capacity and faster transfer rate.

Unlike floppy disc drives, Winchester drives are enclosed in sealed casings, allowing very high track density, up to 600 compared with 40 or 80.

Their discs are non-removeable, rotating continuously at high speed (3600 rpm), enabling data to be transferred 20 times faster than single-density floppy discs.

The Solidisk Winchester drive has a further advantage over some competitors. It has "buffered seek", hence stepping pulses can be as short as 2 microseconds. This results in an average access time of 80 milliseconds — less than one-hundredth of some other drives. This is especially important as the Winchester fills up, for example when used with a large database.

Hardware requirements

To use a Solidisk Winchester, you will need either a BBC Plus or a BBC model B, fitted with a 1770 Disc Interface (Acorn or Solidisk). The Winchester drive is connected to the 1MHz bus socket.

Software compatibility

The Solidisk Winchester drive is normally used under the Solidisk ADFS, which allows file sizes up to 512 Megabytes and provides a hierarchical directory, permitting an essentially unlimited number of files.

The Solidisk ADFS will run most software available for the BBC computer including all Acornsoft languages and the View family, and Computer Concept Wordwise and the Inter-family. In particular, ViewStore is well suited for databases on Solidisk Winchesters.

All the Acorn Second Processors (6502, 32016 and Z80) are largely compatible with Solidisk Winchesters. Applications such as System ADE running on the 6502, PANOS on the 32016, BBC Basic (Z80) and CP/M (with new HD ROM and HD BIOS) on the Z80 are compatible.

However, software that is not compatible with ADFS will not run.

Prices

The Solidisk Winchester packages consist of:

— One or two Winchester drives, enclosed in a steel casing. The drives come already formatted and loaded with the Solidisk "Initial Software" package, containing a collection of useful programs, such as CATALL, EXALL, ARCHIVE etc.

— A utility disc containing the SAFE program which allows recovery of a corrupted disc.

— A Solidisk ADFS+DFS ROM-set.

— A set of manuals.

Three models are available:

1) 20 Megabytes without its own power supply, but uses that of the BBC Micro .....£575.00+VAT
2) 20 Megabytes with its own power supply .....£650.00+VAT
3) Dual 20 Megabytes with its own power supply .£999.00+VAT

The minimum model is only suitable for use with BBC computers fitted with the current, switched-mode power supply and one Solidisk low power floppy disc drive.

The Linemaster ROM and Modems

The Solidisk Linemaster ROM allows the BBC Micro to communicate with other computers. In addition to the standard Terminal and Prestel modes, it has Viewdata Host Mode and the ability to autodial and autoanswer, all controlled by software.

In Terminal mode, your BBC micro acts as a terminal to other computers, either locally by a serial cable link or remotely, via a modem and telephone line, eg bulletin boards. It supports various BAUD rates and protocols, and has elapsed time clock, 40/80 column screen display etc.

The Prestel mode is designed for accessing the British Telecom Viewdata service. The facilities include tagging, searching and displaying pages, sending and receiving text and downloading software from and to disc.

A special feature of the Solidisk Linemaster ROM allows you to set up your BBC Micro as a Viewdata host. In this mode, other users can communicate with your computer exactly as with Prestel. You can edit pages, make up routing instructions, collect responses etc.

The Solidisk Linemaster Communication ROM works well with all BABT approved MODEMs such as the WS2000, the Nightingale etc but many MODEMs do not support all the features of the Linemaster ROMs. The Telemod 1 for example offers only 1200/75 baud, and is therefore only suitable for communicating with Prestel (or other Viewdata hosts).

Solidisk local experts

Solidisk has a nationwide network of more than 90 local experts and a growing number of experts overseas.

They do not sell our equipment but can generally fit it for you free of charge. If you would like to take advantage of this unparalleled service, ring Solidisk Sales Office.

If you wish to call at our office, please make an appointment.

Tel Southend (0702) 354674
(16 lines)

ORDER BY MAIL: Please complete (or copy) this coupon and send it to:

Solidisk Technology Ltd, 17 Sweyne Avenue, Southend SS2 6JQ

Prices, inclusive of VAT

RAM/ROM expansion

Qty		Price	P&P
.....	Basic Four Meg board	£30.00	£1.00
.....	Four Meg board with 32k RAM	£69.00	£1.00
.....	SWR32 with software pack 1	£53.00	£1.00
.....	SWR64 with software pack 1	£80.00	£1.00
.....	SWR128 with software pack 1	£125.00	£1.00
.....	256k board with WW+ and Manager	£175.00	£1.00
.....	'Ashtray' extension	£15.00	£1.00

DISC upgrade

.....	1770 upgrade with 2.0 DFS ROM	£45.00	£1.00
.....	1770+8271 upgrade, 2.0 DFS ROM	£50.00	£1.00
.....	ADFS+DFS ROM set	£20.00	£1.00
.....	Upgrade from DFS to ADFS+DFS	£10.00	£1.00
.....	Solidisk 80-track double-sided	£109.00	£3.00
.....	Dual drives, CPU and keyboard case	£230.00	£6.00
.....	CPU and keyboard case alone	£30.00	£6.00
.....	EFS for the Electron	£59.00	£1.00

Wordprocessor package

.....	Wordprocessor for the B Plus	£309.35	£10.00
.....	Wordprocessor with 1770 DFS	£458.85	£10.00

Winchesters

.....	20MB without PSU	£661.25	£10.00
.....	20MB with PSU	£747.50	£10.00
.....	40MB with PSU	£1148.85	£10.00

Modems

.....	Linemaster ROM and manual	£10.00	£1.00
.....	Telemod 1 (BABT approved) MODEM, with Linemaster ROM	£50.00	£3.00
.....	Other MODEMs	POA	

Datalife Diskettes

.....	MD525 box of 10	£16.00	£1.00
.....	MD557 (2S/4D)	£25.00	£1.00

Eproms

.....	2764-25 to clear 20 pcs	£25.00	£1.00
.....	27128-25 (or better) pack of 5	£25.00	£1.00
.....	27256-25 (or better) pack of 3	£25.00	£1.00
.....	UVIPROM Eprom programmer	£19.00	£1.00
.....	UVIPROM32 for our 27256's	£21.00	£1.00
.....	UVIPAC Eprom eraser	£20.00	£1.00
.....	Solidisk Toolkit ROM	£10.00	£1.00
	Total	.....	.....

Name: .....

Address: .....

.....

.....

BARCLAY

ACCESS

We reserve the right to change prices and specifications without notice. If you wish to call at our office (Mondays to Fridays 9.30am to 5.30pm), please ring for an appointment.

MU3

SPECIAL OFFER

SAVE OVER £35

Micronet 800

Micronet 800 is the UK's most popular database for BBC users. There's FREE SOFTWARE, FREE ELECTRONIC MAIL, 70,000 other users nationwide, your own technical and user group areas, plus Prestel* and much, much more!

As a special offer to BBC owners, Micronet is offering you your first quarter's subscription to Micronet & Prestel plus the Micronet Modem 2000† (ROM software)

All for £49.95

ACT NOW. Offer only open whilst stocks last. Simply complete the coupon below and return it to the address shown.

Make the most of your micro

Send to: **Micronet 800, Telemap Ltd, 8 Herbal Hill, London EC1R 5EJ.**

Please rush me my Prism 2000 modem and three-month subscription to Micronet 800 and Prestel.
I enclose a cheque/postal order to £49.95

Or please debit my Access/Visa card No:

NAME: .....

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Make cheques payable to Telemap Ltd. Allow 28 days for delivery. MU3.86

†APPROVED for use with telecommunication systems run by British Telecommunications in accordance with all conditions and instructions for use.
(S/1127/3/D/021674)

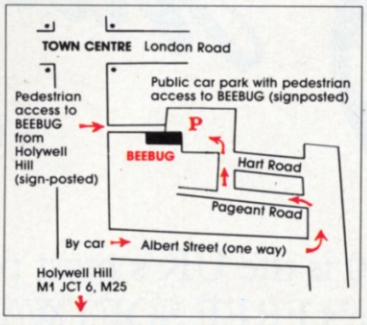
*Prestel and the Prestel symbol are Trade marks of British Telecommunications.

BEEBUG SHOWROOM AND MAIL ORDER

The products in this price list are available in our showroom in St. Albans and by mail order. Telephone your order on 0727 40303 or send the order form to the address below. Alternatively come along and see us. We are open 9 - 5.30 Mon - Sat, and there is ample parking at the rear of our premises.

We take both Access and Visa credit cards. Simply telephone us on our multi-line telephone number 0727 40303 quoting: Cardholder's Name, Cardholders Address, Cardholder's Telephone number, Credit Card number, expiry date, order details.

PLEASE NOTE: that the mail order despatch address must be the same as the cardholder's address.



BEEBUG MAIL ORDER
Dolphin Place, Holywell Hill,
St. Albans, Herts. AL1 1EX
Tel: 0727 40303 — Multi-lines

- Computers
- Printers
- Monitors
- Disc Drives
- Budget Discs
- Software

COMPUTERS

BBC B Plus. There are two versions of this machine, the standard 64K with shadow screen memory at £459, and a 128K model at £489 with a special Basic and 64K user ram available for programs!

Second Processors. At £189 the 6502 second processor remains the best way of adding memory, invaluable for word processing and spreadsheet users.

Disc Interface Offer. Our special Disk system starter pack offer has come to an end. However, we can now offer a free box of 10 Disks with ANY order for an Interface kit, and any drive ordered together. This allows you complete flexibility in your choice of drive. We will send you appropriate discs.

Code	Description	Price inc. VAT
0202	BBC B Plus Computer	459.00
0220	BBC B+ with Econet	499.00
0221	BBC B+ 128K	489.00
0203	'6502' 2nd Processor	189.00
0204	'Z80' 2nd Processor	389.00
0205	Acorn Prestel Adaptor	129.00
0206	Acorn Teletext Adaptor	139.00
0210	A to B Upgrade Kit	69.00
0212	Acorn Speech Upgrade	46.00
0209	1.2 DNFS Rom	19.50
0217	1770 Disc Controller Upgrade Kit	49.00
0218	ADFS Rom for 1770 DFS	29.00
0213	Watford DFS Rom and Manual	26.50
0214	Watford DDFS Rom + Manual	98.00
0216	Watford DFS Manual	6.95
0219	Watford DFS Kit	85.00
0223	Acorn 1.2 DNFS upgrade	89.00

DISC DRIVES AND DISCS

Beebug continue to use and to recommend the Cumana range of disc drives. These have been used extensively in our offices and have proved very robust and reliable.

Code	Description	Price inc. VAT
0600	Cumana 100K CSX100 40T	97.00
0610	Cumana 100K CS100 40T	127.00
0601	Cumana 200K CDX200 40T	187.00
0602	Cumana 400K CSX400 40/80T	113.00
0603	Cumana 400K CS400 40/80T	133.00
0604	Cumana 800K CD800S 40/80T	252.00
0605	Watford 200K CLS200 40T	88.00
0606	Watford 400K CLS400S 40/80T	91.00
0607	Watford 400K CS400S 40/80T	114.00
0608	Watford 800K CD800S 40/80T	206.00
0650	Memorex Discs S/S D/D 48TPI 3481	15.50
0651	Memorex Discs D/S D/D 96TPI 3501	25.50
0652	Memorex Disc Head Cleaning Kit	9.65
0653	Library Case — 10 discs	2.25
0654	Disc Storage box — 50 discs	9.00
0655	Lockable Disc Box (35)	13.80
0656	Lockable Disc Box (80)	17.25

BEEBUG DYNAMIC DISCS

Code	Description	Price inc. VAT
0657	10× 48TPI SS DD Discs + Free Box	14.40
0658	10× 48TPI DS DD Discs + Free Box	20.00
0659	10× 96TPI SS DD Discs + Free Box	20.00
0660	10× 96TPI DS DD Discs + Free Box	21.40
0661	25× 48TPI SS DD Discs + Free Box	33.90
0662	25× 48TPI DS DD Discs + Free Box	45.19
0663	25× 96TPI SS DD Discs + Free Box	45.19
0664	25× 96TPI DS DD Discs + Free Box	48.90
0665	50× 48TPI SS DD Discs + Free Box	58.30
0666	50× 48TPI DS DD Discs + Free Box	81.40
0667	50× 96TPI SS DD Discs + Free Box	81.40
0668	50× 96TPI DS DD Discs + Free Box	92.49

OTHER HARDWARE

Roms and Rams. The 2764 8k EPROM is still just £2.30, with the 27128 16k version at £3.45. "Shadow" RAM to increase user memory in Modes 0 to 6 can be added with either the Aries B32 RAM Board or the Watford 32K RAM Card, which can live in the machine together with most of the popular ROM expansion boards.
Joysticks. Joysticks are just the thing to make use of the best in Games software and now also increasingly used in more serious applications. The Voltmace 3Bs are popular and robust and the added keypad on the 14b has a host of interesting possibilities.

Code	Description	Price inc. VAT
0700	Aries B20 RAM Card	86.50
0701	Aries B32 RAM Card	91.00
0702	Watford 32K RAM Card	69.00
0703	AMX Mouse	79.95
0704	ATPL Sidewise ROM Board	39.00
0705	2764 8K eprom	2.30
0706	27128 16K eprom	3.45
0707	6264 8K ram	4.00
0708	Eprom Extractor	5.00
0709	Eprom Eraser	32.20
0710	Softlife Eprom Blower	75.90
0711	Nightingale Modem	120.00
0712	Pace Commstar	33.00
0713	Phone 2 into 1 adaptor	6.32
0714	BBkey Function Key Labels	2.00
0717	Watford Sideways ZIF	17.25
0718	Voltmace Delta 3B Single Joystick	11.99
0719	Voltmace Delta 3B Twin Joystick	19.95
0720	Voltmace Delta 14B Joystick/Keypad	14.95
0721	Voltmace Delta 14B/1 Interface	14.85
0722	13 amp 4-way plug block Extension	10.35
0724	Antex CN17 Soldering Iron	6.79
0726	8 way DIP switch	0.98
0727	RS423 domino plug	0.46
0728	RGB 6 pin DIN plug	0.46
0729	Cassette 7 pin DIN plug	0.30
0730	3-core 6 amp Mains Cable (per m)	0.35
0731	4-core RS423 Cable (per m)	0.20
0732	6-core RGB or Cassette Cable (per m)	0.25
0733	Safebloc Test Connector	11.50
0734	BBC Replacement Keyboard	46.00
0735	ATPL Battery Backup kit	17.00

MONITORS

Colour Monitors. Visitors to our showroom have been bowled over by the astonishing resolution and rock-steady image of both graphics and 80 column text of the Sanyo 3115 Ultra High Resolution Colour Monitor. The Philips CT2007 Colour TV + RGB Monitors also offer superb value and can easily resolve 80 column text.
Monochrome Monitors. Our Kaga 1203 Amber Screen Monitor is proving a real winner. Very easy on the eyes, even after many hours use.

Code	Description	Price inc. VAT
0500	Kaga 1201 G Hi-res Green	103.50
0501	Kaga 1202G Ultra Hi-res Green	120.75
0502	Kaga 1203A Ultra Hi-res Amber	120.75
0503	Zenith 123 12" Green	75.90
0530	Microvitec 1431 Med-res Monitor	218.50
0531	Microvitec 1451 Hi-res Monitor	276.00
0532	Philips CT2007 14" TV Monitor	225.00
0533	Sanyo Very Hi-res 14" Monitor 3115	449.00
0534	Phillips CT1114 14" TV Monitor	253.00
0550	1.0m Monitor Lead RGB	5.75
0551	1.0m Monitor Lead BNC Zenith/Kaga	3.45
0552	Single Plinth for Monitor/Printer	12.65
0553	Double Plinth for Monitor	21.85
0554	Memorex TV and VDU Cleaning Kit	4.51

SOFTWARE

BEEBUGSOFT SPELLCHECK III is proving very popular as it is now has 2000 words actually in the Eprom. This makes it very fast indeed and it is still the easiest to use checker for both Word-Wise and View files.

New Releases Superior Software's "Speech!" Disc allows your Beeb to talk to you without the need for a speech processor to be fitted. This amazing Software is very easy to use and can even speak foreign languages!

Code	Description	Price inc. VAT
1122	Speech! disc	11.45
1000	Acornsoft View	53.00
1021	Acornsoft View Index	14.95
1001	Acornsoft View Sheet	53.00
1002	Acornsoft Hi-View	55.00
1019	Acornsoft View Store	533.00
1003	Acornsoft Lisp Rom	49.00
1004	Acornsoft BCPL	56.00
1005	Acornsoft Comal	49.00
1006	Acornsoft Logo	69.00
1007	Acornsoft ISO Pascal	69.00
1008	Acornsoft Basic Editor	29.00
1009	AMX Desk	21.95
1010	AMX Utilities	13.45
1020	AMX Paint Pot	13.45
1011	BBCsoft UltraCalc 2	75.00
1012	Acornsoft Elite Disc Version	17.00
1013	View Printer Driver Generator Cassette	9.90
1014	View Printer Driver Generator Disc	11.50
1015	Revs Disc	17.00
1016	Aviator Disc	17.00
1100	Wordwise Plus	52.90
1112	Hi Wordwise Plus Disc	6.50
1102	Wordwise	35.00
1106	Accelerator	58.90
1109	Disc Doctor	28.00
1103	C.C.Graphics ROM	28.00
1110	Intersheet	51.35
1114	Intershort	29.00
1111	Hi Intersheet Disc	6.50
1104	Printmaster (Epson)	28.00
1105	Printmaster (Star)	28.00
1107	C.C.Speech ROM	30.00
1108	Acorn Speech Processor (with 1107)	10.00
1118	White Knight Mk 12 Disc	19.00
1017	GXR B	29.00
1018	GXR B+	29.00

PRINTERS

Letter Quality. The Juki 6100 Daisywheel printer remains super value for applications demanding true letter-quality printing.

Colour Printers. The Canon PJ1080A Full Colour printer continues to amaze even Beebug staff with the brilliance and range of colour it can provide. Our new "Dumpmaster" ROM contains all you need to drive it for suberb colour screen dumps. We also stock the new Epson JX80 Colour Matrix Printer which is also capable of high speed listings.
Plotmate Offer Continues. The Linear Graphics Plotmate continues to be a very popular plotter and we are happy to announce that we can continue to offer this at the very special price of £333.50.
Kaga/Taxan & Canon PW1080A. These printers are proving very popular and we can now offer a package providing virtually instant access to at least EIGHT new NLQ Fonts. "FONTAID" comes complete with demonstrations and a special "VIEW" Printer Driver. Please write to our Retail Manager for sample printouts.
NOTE: "FONTAID" needs an 8K Ram chip fitted to your printer (our stock code 0707).

Code	Description	Price inc. VAT
0300	Brother HR 15 Daisywheel	373.75
0301	Canon PW1080A 10"	340.00
0302	Canon PW1156A 15"	405.00
0303	Canon PJ1080A colour	460.00
0304	Epson LX 80	270.00
0305	Epson RX 100	392.00
0307	Epson FX 100	490.00
0308	Epson JX 80 colour	569.00
0309	IBICO LTR1 Letter Quality	138.50
0310	Juki 6100 Daisywheel Printer	359.00
0311	Kaga KP 810	263.35
0312	Linear Graphics Plotmate	333.50
0313	LX80 Tractor Feed Unit	23.00
0314	LX80T Offer Package	274.00
0400	Platten Cleaner Kit	6.00
0401	2M Printer Lead	10.00
0402	Epson FX80/RX80 Ribbon	5.00
0403	Epson FX100/RX100 Ribbon	10.00
0404	Juki 6100 Daisywheel (Wheel)	20.50
0405	Brother HR-15 Daisywheel (Wheel)	20.50
0406	11"×9.5" P/Paper (2000)	14.50
0407	3.5"×1.44" Labels (2 across - 1000)	5.00
0408	Canon PW/Kaga Taxan Ribbon	6.79
0411	HR-15 Correctable Ribbon	4.30
0412	HR-15 Nylon Ribbon	4.30
0413	LX 80 Replacement Ribbon	5 50
0414	Ibico Ink Roller	4.60
0415	Epson JX80 Ribbon	14.95
0419	"FONTAID" Rom & Disc 40T	30.00
0420	"FONTAID" Rom & Disc 80T	30.00
0421	"FONTAID" Supplementary Disc 'A'	15.00

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CARRIAGE. Please **add £1.00** carriage to all orders except Computers, Monitors, and Printers **add £7.00** per item. Disc Drives, 2nd Processors, Modems etc. **add £5.00** per item. Listing Paper **add £2.00** per box.

BEEBUG MAIL ORDER
Dolphin Place, Holywell Hill, St.Albans, Herts. AL1 1EX
(Dolphin Place is opposite 18 Holywell Hill in the centre of St.Albans).

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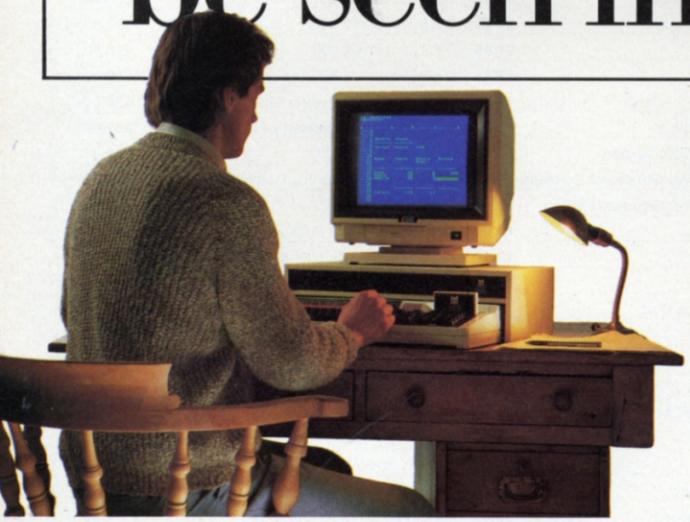
ADDRESS:
POSTCODE:
DAYTIME TELEPHONE NO.

SUB TOTAL	£
CARRIAGE	£
TOTAL	£

ACCESS/BARCLAYCARD NO:

In accordance with our competitive pricing structure prices are subject to alteration at any time.

The new BBC microcomputer series will be seen in all areas.



The BBC Master Series is a continuation and development of the highly popular BBC Micro. As such, the series retains all of the BBC Micro's traditional virtues including BBC BASIC and a superior choice of software and peripherals.

Though never before has one microcomputer encompassed such a wide range of applications or offered so much potential.

THE HOME.

BBC Micros have gained a reputation as powerful, versatile home computers.

The Master 128 will prove an even more useful addition to the household.

Your child is probably already familiar with it from school. In which case, our educational programs will ensure that learning continues at home.

By using a Teletext adaptor, up-to-the-minute information can be called up instantly.

And via a Modem, you can control all the money in your bank account, paying bills and standing orders from the comfort of your own home. You can even write and send letters on screen by Electronic Mail.

Yet despite these advances, the price remains the same at £499 inc. VAT.

To speed up other tasks, there is the Master TURBO. For an extra £125 inc. VAT, it improves the Master 128's benchmark from 9.2 seconds to a record-breaking 4.67 seconds using BBC BASIC.

THE SCHOOL.

The BBC Micro is already to be seen in 75% of our schools. New features on the Master 128 make it particularly useful in the schools

THE MASTER 128. 128K RAM 2 x 256K ROM CAPACITY CARTRIDGE SOCKETS. REAL TIME CLOCK/CALENDAR. VIEW, VIEWSHEET, EDITOR AND TERMINAL. THE MASTER ET. 128K RAM AND 64K ROM. ADVANCED NETWORK FILING SYSTEM. 32K BYTES OPERATING SYSTEM. 16K BYTES BBC BASIC. *THE MASTER TURBO. RAM. HARDWARE FLOATING POINT. SEND FOR FULL DETAILS FROM BOB COATES, ACORN COMPUTERS.

area. The word processing package makes it ideal for creative writing.

While its sophisticated spreadsheet will prove invaluable in any Maths Class.

As an upgrade of the 128, the Master 512 gives higher levels of education access to MS-DOS compatible applications. For under £500.

Or for only £348.26 exc.VAT you have the Master ET – a powerful, custom-built networking terminal.

Our ECONET networking facility is probably the world's best selling, low cost network.

Combined with the Master ET, it affords considerable cost saving without limiting your expansion options, ensuring the BBC Micro's place throughout our education system.

PROFESSIONAL.

Business dictates that a microcomputer is both efficient and easy to operate.

The Master 512 puts all the power of 16-bit computing under your control, for under £1,000.

This control comes courtesy of the GEM Collection which provides an icon-driven, simple and easy to use environment, as well as a word processor and painting package. Not only does this allow you to write documents easily, but also to insert charts and graphs into them. Thereby improving your business presentations.

Though business is only one of the areas in which the Master 512 will be taking control.

In the Medical field, it could be taking the drudgery out of repeat prescriptions. At the same time monitoring dosage for optimum patient care.

Existing BBC Micros are capable of running an entire factory. The more sophisticated Master 512 could check every stage in a manufacturing process from beginning to end.

Of course, your immediate needs may not be on quite this scale. So you could buy the Master 128 now and easily upgrade to the Master 512 at a later stage.

THE LABORATORY.

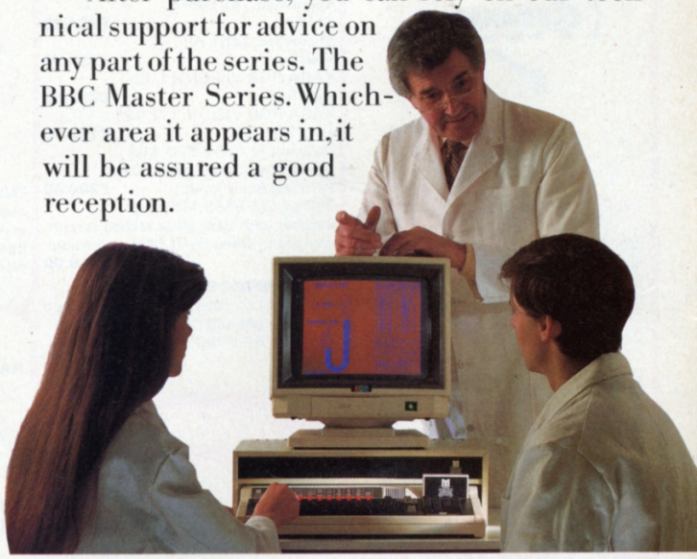
As a simple upgrade to the Master 128, the Master Sc. provides a powerful scientific computer for under £1,500. A tenth of the price of its nearest mainframe equivalent.

The Master Sc. forms a natural and compatible link with the first in the extremely powerful Acorn Cambridge Work Station range.

Naturally it uses all the important scientific languages – ISO PASCAL, FORTRAN 77, C and 32016 ASSEMBLER as well as BBC BASIC.

For anyone who is teaching languages, the Master Sc. is a particular asset. You can now afford to teach more by practice rather than theory.

After purchase, you can rely on our technical support for advice on any part of the series. The BBC Master Series. Whichever area it appears in, it will be assured a good reception.



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Master 5c Upgrade	T.B.A.
Eprom Cartridge (2EF)	£14.95
BBC Model B + 64K	£396.00
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BBC Model B + 128K	£414.00
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CS 400 (400K) 1 x 80 Track Double Sided Drive Incl. PSU	£125.35
CD 800S (800K) 2 x 80 Track Double Sided Drive Incl. PSU	£212.75
Mitsubishi (400K) Single Disk Drives Cased 40/80 Track Switchable with two years warranty	£95.00

TCL Special Package

The TCL All In One Word Processing

Package contains a Master 128, High Res Green Monitor, 800K Dual Drives with PSU, Quendata Daisy Wheel Printer together with a box of Discs, Paper, and all the Cables.

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BBC Upgrades

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Acorn DFS Interface	£89.00
Econet Interface	£48.99
Speech Interface	£25.00
64K Upgrade Kit	£39.95
17/70 Upgrade Kit	£49.94
ADFS ROM	£29.95
NFS ROM	£19.55

Monitors

MONOCHROME MONITORS

Phillips BM 7502 Green Screen	£79.00
Phillips BM 7522 Amber Screen	£95.00
Kaga KX 1201G Hi-Res Green	£103.00
Kaga KX 1203G Ultra Hi-Res Amber	£120.00

COLOUR MONITORS

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Microvitec 1451 Med-Res	£270.25
Microvitec 1441 Hi-Res	£391.00
Microvitec 2030 CS 20 Std Res	£425.50
Microvitec 1431 AP Std Res	£224.25
Microvitec 1451 AP Med Res	£293.25
KAGA RGB VISION 11 12" High Res	£258.00
KAGA RGB VISION 111 12" Ultra High Res	£365.00
Phillips CM 8501 STD RES Monitor with grey glass Screen RGB and Audio input	£209.00
Phillips CM 8533 Med Res monitor with dark glass etched screen composite video input RGB and Audio Input	£289.00

TV MONITORS

Phillips 1114 colour TV/monitor with 14" tube offering 10 Preselect channels RF CVBS and RGB inputs **£199.00**

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DEMON MODEM

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Demon with BBC ROM	£81.00
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Printers

NEW

NOW AVAILABLE

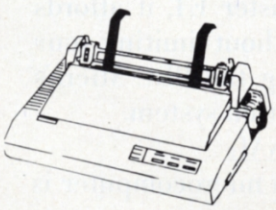
JUki 5510 – Gives you 180 CPS & NLQ Standards

£269.00 Inc. VAT

. . and that's not all! The Juki 5510 also has full graphics mode, two position 'dip-switch' (providing instant compatibility with both the Epson and the IBM Graphic Printer). Standard 2K memory (expandable to 14K) built-in Parallel Centronics interface and 8-switch international character sets.

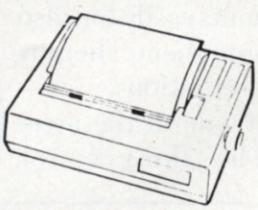
If you need Colour too, the optional Juki 5510 Colour Kit gives you seven colour printing for . . . **£112.00**

CITIZEN 120 D



This new Citizen 120D with 120 CPS and 25 CPS NLQ comes with tractor and friction feed as standard. IBM and Epson compatible with TWO years warranty **£175.00**

KAGA KP 810



The 80 column printer with 140 CPS Draft and NLQ with friction and Tractor feed offering 9 INT character sets, long life cartridge ribbon and standard centronics interface **195.50**

Also available KAGA KP 910 (wide carriage printer) **£379.00**

EPSON LX80

with 100CPS draft and 16CPS NLQ and optional tractor adaptor and sheet feeder. This printer has a standard parallel connection and accepts all other Epson serial and parallel boards with external dip switches for easy access and internal 1K buffer. It offers a high specification at a low price **£229.00**

ALSO AVAILABLE

Epson FX 80	£365.00
Epson FX 100F/T	£495.00

Seikosha GP 50A (Parallel)	£69.00
Seikosha GP50S inc. Printer I/F + Cables	£69.00
Seikosha 1000A (NLQ)	£199.00
Canon PW 1080A (NLQ)	£269.00
Canon PW 1156 A	£379.00
Star SG 10	£249.00
Star SG 15	£389.00
Brother EP 44	£228.00
Shinwa CP 80A	£189.00
MP 165	£240.00
Juki 5100	£269.00

DAISYWHEEL PRINTERS

QUENDATA DWP 1120

with optional tractor/sheet feeder and 13" paper width facility.

This Daisywheel printer with 20 CPS has 96 character printwheel compatible with the QUME. Standard centronics interface (optional RS232 C) **£199.00**

Brother HR 15	£349.00
Juki 6100	£319.00
Juki 2200	£275.00
Juki 6300	£799.00

COLOUR PRINTERS

Canon PJ1080A	£440.00
Juki 5500	£286.00

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LX 80	£23.00
Juki 6100	£129.00
Juki 6300	£129.00
Quendata DWP 1120	£114.00
Brother HR 15	£95.00

SHEET FEEDER

Juki 6100	£173.00
Juki 6300	£173.00
Quendata DWP 1120	£165.00
Brother HR 15	£212.00

Printers

PRINTER RIBBONS

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Brother EP 44	£2.65
Brother M1009	£4.60
Brother HR15/25 Multi-strike	£5.45
Brother HR15/25 fabric	£4.85
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Epson LX80	£4.90
Epson MX 100	£5.80
Epson LQ 1500	£6.60
Epson DX multi-strike	£5.40
Epson DX 100 fabric	£4.85
Juki 6100 multi-strike	£3.20
Juki 6100 single-strike	£1.95
Juki 6300 multi-strike	£3.05
Juki 6300 fabric	£4.10
Juki 2200 single strike	£2.95
Juki 2200 correctable	£2.88
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MP 165	£4.50
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Seikosha GP100/250	£4.30
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COMPUTER

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Services

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7438	£0.46
74 LS 163	£0.86
74 LS 244	£0.92
74 LS 245	£1.27
74 LS 375	£1.04

BBC Firmware

FIRMWARE

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BEEBUG

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BBC Firmware

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NEW CENTRONICS DOT MATRIX PRII
TWICE AS FAST AS THE OLD GL

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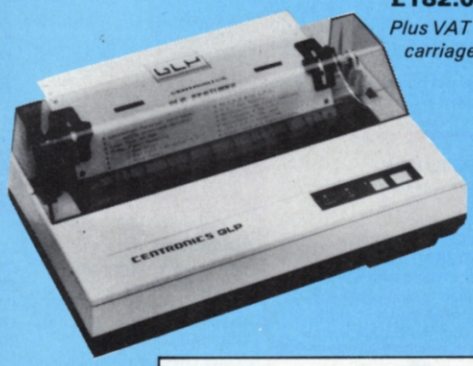
Plus VAT & carriage



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- Original plus 2 copies
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M-1109	Dual Interface with T/F	**£225.40**
M-1109	Dual Prestel	**£247.25**
EP-44	Teleprinter	**£227.70**
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THE MICRO USER

March 1986

NEWS

SUPER SHOWS ON THE WAY

DATABASE Publications has lined up another great trio of shows for BBC Micro owners this year. Dates and venues have been decided, hardware and software suppliers are rushing to book their stands, and developers are working non-stop to provide a wide range of exciting new products.

The first of the shows is only two months away, and particulars of how you can save money by obtaining your tickets early are given on page 77.

Details for your diary of these not-to-be-missed Electron & BBC Micro User Shows are:

- **May 16, 17 and 18 Royal Horticultural Hall, London.**
- **September 26, 27 and 28 UMIST, Manchester.**
- **November 7, 8 and 9 Royal Horticultural Hall, London.**

MicroLink subscribers can see a full listing of micro shows both here and abroad.

PRODUCTION BOOST FOR MASTER SERIES

ACORN has ramped up production of its new Master Series which has been so successful since its launch that sales have exceeded targets by 30 per cent.

Now officials are having to raise the original forecast that total sales would reach 100,000 by the end of the year – and the new figure is likely to be considerably higher.

Acorn's product manager, Bob Coates, admits they have been caught on the hop by the heavy initial demand.

"As a result we have had to up production", he told *The Micro User*.

Meanwhile the company's main dealers reported that they soon found themselves running out of stock following the launch.

John Taylor of 3SL, Cheshire, was unsurprised by the demand. "The product has been properly designed to meet market requirements and therefore response was always going to be tremendous.

"We have a lot on order and I just wish the machine was more freely available".

"The Master has given the Acorn series a new lease of life", says Viglen's managing director Vig Boyd. "The response we have had to it has been very impressive. It will be *the* advanced research machine".

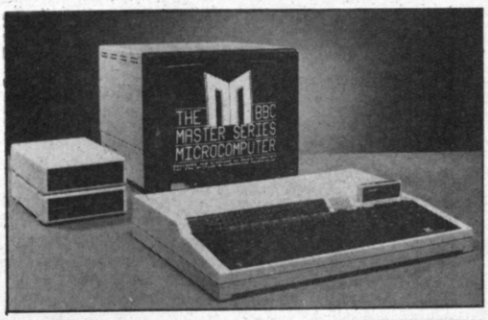
Also reporting a heavy demand is Nazir Jessa, of Watford Electronics. "I expect our sales to reach thousands in the first quarter", he said.

He believes that the Master Series could be even more popular. "I think if Acorn lowered its prices the machine will have no competition – it will sweep the floor with its rivals".

- Acorn's talks with the Department of Trade and Industry have resulted in the Master Series firmware being included in the Software for Schools Scheme.

The DOI has said that £105 worth of firmware contained in the machines is directly relevant to education and as such is eligible for funding under the scheme.

Support available for local education authorities in the financial year 1985-6 is 100 per cent, and for 1986-88, 50 per cent.



Acorn shares shoot up

MYSTERY surrounds a sudden and dramatic rise in the value of Acorn Computer shares. As this issue of *The Micro User* went to press the shares – which at one time last year were worth only 4p each – were hovering above 100p.

This is three times what they were valued at only two weeks previously.

Spokesmen for Acorn and its brokers Phillips and Drew confessed that the sharp upward valuation in such a short period of time had them baffled.

A rumour circulating in the City that Olivetti – holder of more than 80 per cent of Acorn's shares – was bidding for the lot was dismissed by the Phillips and Drew spokesman.

"The most likely reason for the sudden activity is that Acorn products have been receiving a lot of good notices in the media recently", he said.

"Added to which the well respected firm of stockbrokers and researchers Wood-MacKenzie recently published a bullish circular on the home computer industry.

"I would point out that the increase in share values would not appear so dramatic if calculated on the units involved before last September's refinancing package was implemented.

"Only time will tell whether this current surge in Acorn share prices is sustainable".

Micro range listed

A SERIES of catalogues has been produced by Acorn bringing together details of the devices, programs, books and services now available to users of the BBC Micro range.

They cover seven main areas – general interest, education, science and industry, peripherals, business, medicine and communication and information retrieval.

Each catalogue has a contents page, price index, list of producers and an easy to use key detailing the products format, compatibility and any need for additional equipment.

NOW YOU CAN LOG ON TO THE WEATHER...

Clear skies over Britain in this printout of a satellite picture from space

A DRAMATIC breakthrough on the home computer front will allow BBC Micro users around the world to discover what the weather holds in store every day of their lives.

Whether they live in Turkey or Torquay, they will now be able to predict sunshine or showers with all the accuracy of the men from the Met Office.

The reason for this is WeatherLink, a revolutionary service which offers the facility to download the satellite weather maps used by professional forecasters.

Exclusive to subscribers to MicroLink, the UK's fastest growing international electronic mail organisation, WeatherLink seems to transform weather forecasting for people at home.

"It means that BBC Micro users can now have all the latest information from the satellite literally at their fingertips", says Derek Meakin, head of MicroLink.

"From now WeatherLink will keep them in constant touch with what is being monitored from outer space".

To achieve this MicroLink has joined forces with an ongoing project run by a Kent schoolmaster and his pupils.

Swadelands School in Lenham, Kent, now finds itself at the forefront of satellite monitoring with its Swafax project.

Using a crossed dipole – an X-shaped aerial on top of a pole – it has been regularly picking up startlingly clear signals from NOAA 9, the main weather satellite.

The school's aerial uses circular polarisation to follow NOAA 9 every time it appears on the horizon, faithfully picking up its signals until it disappears from view again some 15 minutes later.

And the same sequence is followed four times a day.

Live pictures produced by the weather satellite – it takes two at a time, one in visible light, the other infra red – clearly shows that part of the world from North Africa, through Europe and Great Britain up to Iceland.

All are faithfully recorded on the BBC Micro in Swadelands School ready for transmission to the main MicroLink computer.

The next stage involves a converter which takes the image and readies it for transmission via a modem over a standard telephone line.

Once a BBC Micro user who subscribes to MicroLink logs on all he needs to do is to pull down the information file in its expanded format, compress it using specially written software also on the menu, then display it on his monitor.

BBC Micro users who use the communications module of Mini Office II will find that this software will automatically compress the picture for them.

WeatherLink users will also be able to access general information about the weather satellites.

For although NOAA 9 is the principal source of information for weathermen, there are other similar satellites, including a Russian one.

In fact some time in the future WeatherLink will also take information from Metosat, a geostationary satellite in synchronised orbit, so making it seem to be always in the same position.

The reason for this was explained by Victor Young, the science master in charge of the Swadelands School tracking project.

"At certain times of the year the sun is in the wrong position to allow NOAA 9 to provide precise weather images. So then we'll use Metosat as a back up".

Some 12 students aged 11 and 12 are constantly involved in the Swafax project under Victor Young's direction.

As it is treated as an extra curricula activity, they come in early each morning, give up their breaks and stay after school to collate data.

"But it is all so exciting they are glad to do it", says Victor Young. "And what has really thrilled them is the thought of the service they are now providing for BBC Micro users all around the world".

Satellites' big impact on education

SIGNALS from space are permeating Britain's classrooms to such an extent that a national body has been set up to develop the use of satellite data by teachers.

The UK Coordinating Committee on Satellites in Education says many schools and colleges are already receiving and processing data from orbiting satellites.

And it forecasts that the use of this data will have an increasingly significant impact on the secondary school curriculum.

Opportunities for technological projects such as constructing detecting apparatus and creating computer systems are waiting to be tapped, says the committee.

Large scale research involving the collection, processing and interpretation of considerable amounts of live data is another suggested application.

And an abundance of cross-curricular activities linking maths, science and technology with the humanities, particularly geography, are made possible by satellite data.

Direct broadcasting satellities can even be used as an aid in modern language teaching, says the committee.

Its first task will be to identify the roles of satellites and satellite data in education, and ascertain what information and equipment teachers need in order to use and develop the resource.

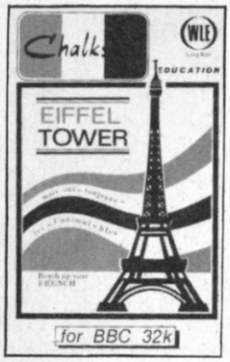
It will also assess what software is needed and try to ensure its development, and identify how funds can be used to promote the use of satellites in education.

The committee has published a 40 page booklet called Satellites in Education as a guide to teachers.

It deals with educational possibilities, satellite orbits and tracking procedures, apparatus requirements, sources and aerial prices.

The booket costs £3.50 from AMSTAT, 94 Herongate Road, Wanstead Park, London E12 5EQ.

A strategy paper giving further information can be obtained free of charge from Dr John Gilbert, Department of Educational Studies (AA), University of Surrey, Guildford GU2 5XH.



A word for your holiday

FOR BBC Micro users who would like their conversations abroad to extend to more than a Bonjour or Guten Tag, Chalksoft has produced two French and one German vocabulary building programs.

Centre Ville is a three-part program, price £17.50 on disc. The first part features a town centre through which a French traveller must be guided using the correct phrases.

Coleurs contains a series of games designed to help in the correct naming – including gender – of colours and animals.

And the third part, Notre Dame, tests the user's ability to tell the time in French.

In Eiffel Tower the user must correctly translate words in order to construct the famous Parisian attraction.

Das Schloss, intended for those learning German, is similar in style to Effel Tower, but this time the user must build a fairy tale castle.

Both programs cost £9.25 on cassette, £14.25 on disc and have facilities for the user to extend the vocabulary.

Of chips and Chippendale

CHIPPENDALE might well turn in his grave, but a Norfolk furniture maker has opted for the BBC Micro to help produce his designs. According to Cy Woodrow, computer aided design provides the perfect blend of modern technology and traditional craftsmanship.

It certainly seems to work as orders are currently flooding in from all over Britain for his chairs priced at £160 and tables from £450. Cy Woodrow has linked a Robo Bitstik to the BBC Micro to get the best results.

"Producing designs on the computer screen allows my customers to see exactly what the finished article will be like", said Cy.

Above, Emma Woodrow designs a piece of furniture for her husband.

Simulation program extended

MICROPACS has extended its dynamic simulation program for the BBC Micro, the BCSSP.

The program already allows users to draw blocks from equations to see what effect different variables have on them.

Its main market is engineering, mathematics, chemistry and physics departments of colleges and universities.

But following approaches from many quarters the company has decided to release an extension, the BSETR.

This enables the user to dispense with the time consuming task of translating equations into the block orientated input language of the system. Equations are typed in and the new program automatically translates them.

Facts on discs

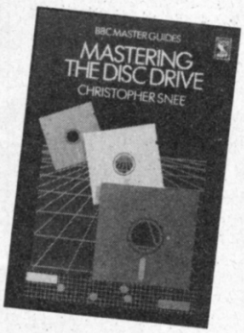
TWO new releases from BBC Publications get to grips with the basics of the disc drive system and mathematics.

They are Mastering the Disc Drive, by Christopher Snee, and Number Games, a software suite – both for the BBC Micro.

The book is divided into three main sections: an introduction to the use of the disc system, how to care for it and an explanation of DFS commands and OS calls, a detailed description of how the disc controller chip works and how to program it and an explanation of random access filing. Price is £7.95.

Number Games is the BBC's latest computer software aimed at primary school children learning maths. Six programs cover the basics – Boxes, Number Knight, Ladder, Little Blokes, Nimble Knight and Light Up.

It was developed by Ismec, the Independent Schools Microelectronics Program. Priced at £9.95, the programs are easily transferred to disc.



Snooker version released

THE game BBC Micro-owning snooker fans have been waiting for has been released by software house CDS.

Steve Davis Snooker comes with computer play options giving demonstration games and has two particularly novel features. It is the only snooker game which gives the user the option of making a player go again if he plays a foul shot resulting in a snooker.

And clearly visible on the screen is the score in the current break and the colour selected by the player at table, allowing the game to be left for a period and resumed when convenient.

There are a number of skill levels, three table speeds, and a large range of power settings help to make for precise cue control.

Steve Davis Snooker costs £8.95 on cassette and £12.95 on disc.

Micro cuts cost of stock

WITH help from a BBC Micro two engineers have come up with an idea that could save their employer more than £100,000.

Brian Levy and Paul Eaton plan to streamline the stocking and handling of millions of valves and semi-conductors used each year by the British Broadcasting Corporation.

The savings would result from reductions in the size of stocks that have to be kept readily available for broadcast engineers.

A former British Telecom engineer, Brian Levy shared his computer knowledge and enthusiasm with Paul Eaton on earlier projects that have benefited their own and other departments of the Corporation.

Now they are working on a system to keep track of the stocks using a BBC Micro that will tell them where, for example, the nearest replacement for a particular transmitter valve can be obtained.

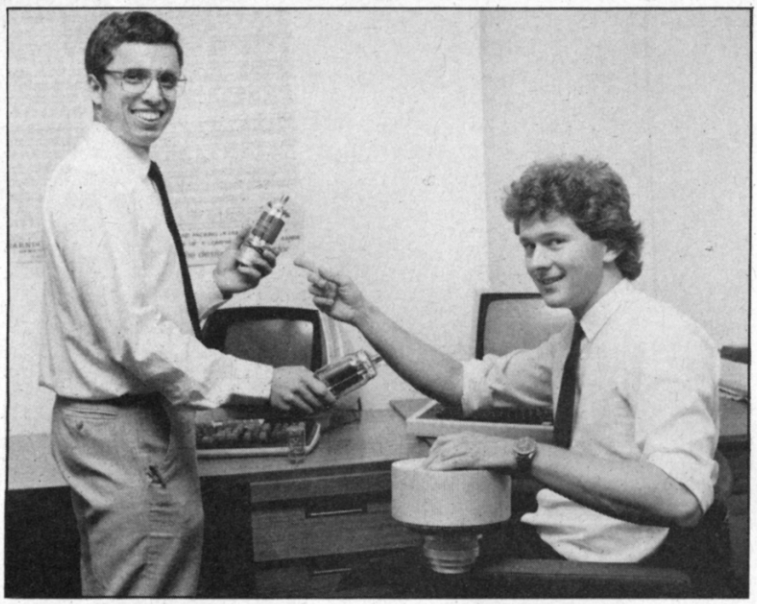
It will also monitor how long particular valves have been in use and so indicate when replacements are likely to be required.

Much of the work on the program has been a spare time job carried out at the Corporation's Motspur Park establishment under senior engineer Geoff Morgan.

"We grab odd moments to do the work", said Brian Levy. "We are improving our efficiency all the time, and keeping up with what other people are doing".

Previous successes include programming BBC Micros to act as terminals for the larger computer that looks after the specifications and ordering of 6,000 stock items.

The saving on that, says Levy, was more than £1,000 a terminal, and it enabled other departments in the Corporation to place orders directly with the computer.



Brian Levy and Paul Eaton ... keeping tabs on transmitting valves

MINI OFFICE TOPS BUSINESS POLL

MINI Office II, the blockbuster suite of business programs for the BBC Micro range, is not the only package currently to have its praises sung.

Its predecessor, the original Mini Office which transformed the face of low cost serious computing in the UK, is still receiving plaudits.

A reader's poll in Popular Computing Weekly has just named Mini Office from Database Software as the Business Program of the Year for 1985.

Last year also saw it reach the finals of not one but two categories of the industry's Oscars – the British Microcomputing Awards.

"Naturally we are very pleased that Mini Office has won yet another bouquet", said Derek Meakin, head of Database.

Improved

"It just proves once again what a difficult act it was to follow".

In fact a total of 26 man years of programming were needed to come up with Mini Office II.

Some of Britain's top software developers were called in not only to improve the four existing modules – word processor, database, spreadsheet and graphics – but also to add another two, label printing and communications.

Already it is being hailed as a potential hit in the same mould as Mini Office, the only non-game to reach No 1 in a Top Ten chart.

"Every indication is that Mini Office II will end up being more successful than even the original version", says Derek Meakin.

SOS trains children

SEARCH and Rescue, which involves BBC Micro users in the coordination of emergency services, is the latest simulation program from Storm Software.

Intended for children from nine to 15 years old, it involves problem solving, decision making and a large amount of work away from the computer.

It is aimed at developing language, writing, history, mathematics, science, geography, nature and environmental skills.

Once an incident is reported the user is given the boat's position, either as ordinance survey coordinates or grid square references. Extra information is then provided, including shipping forecasts, a sea area map, sea and weather conditions and drift.

The user must decide how to proceed, whether to alert lifeboats or helicopters, and from which base.

The package includes booklet, extensive flow chart, Beaufort scale, coastguard's map, background information on the RNLI and HM Coastguard and other information resources.

Price for a 40 track 5.25in disc is £17.65 or £18.65 for the 80 track version £35.30 for BBC Econet.

Teach by Touch Pad

FLOPPY disc drive manufacturer Cumana has introduced a School Series software suite for Touch Pad, the colour graphics plotting aid for the BBC Micro.

Five programs currently available are England and Wales, Scotland, Europe, Heart and Lungs, and The Human Eye. More are under development.

Each test comprises a screen picture and a set of questions. Editing facilities allow the question and location tags to be altered or re-written, with a choice of five sets.

A detailed record of each pupil's achievements and results is kept and can be printed out. The difficulty of the questions can be varied to suit the ability of pupils and up to 200 pupil results can be stored and recalled on one test disc.

The Microdraw-developed programs cost £10.95 each.

More tracks for Revs

FOUR of Britain's most famous motor racing circuits can now be added to Acornsoft's top selling simulation Revs.

The BBC Micro program is already supplied with the Silverstone circuit.

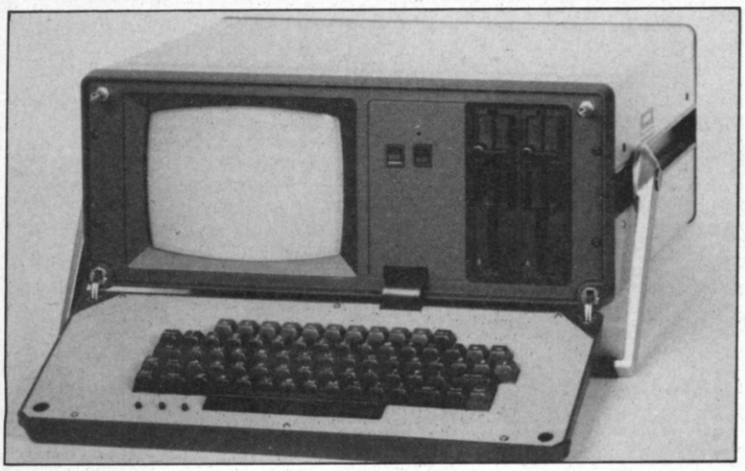
The new tracks, Brands Hatch, Donington Park, Oulton Park and Snetterton, were programmed by author Geoff Crammond with the help of detailed maps, and in some cases videos, of the circuits.

They were tested for accuracy by co-author and Formula 3 driver David Hunt. The pack costs £9.95 on cassette, £12.95 on disc.

Health Data

LAST month's issue of *The Micro User* contained an article on page 25 about Dr Christopher Dobbing, the man behind the Health-Data experimental viewdata service-cum-bulletin board.

The telephone number for the Health-Data service was incorrectly listed. The correct number is 01-986 4360.



Micro slips on some armour

ELECTRONIC instrumentation firm Lawrie T&M has produced a rugged and compact portable BBC Micro suited for use in hostile environments such as industrial sites.

"We recognised the need for such a machine after watching our own sales reps", said sales manager Ashley Short.

"Our new logic analyser system works with a micro. So when our reps went to see prospective clients they had to juggle, not only the product, but micro, monitor and disc drive.

"As it stands the BBC Micro is a very spread out machine, really only suited to a desktop. We wanted to dispense with all that – and the need for makeshift protective screens when taking it on to the shop floor".

LTM's standard portable consists of a 64k micro, integral 9in green screen monitor and 40/80 disc drives housed in industrial quality steel. The housing also has room for a four slot Eurocard.

Its keyboard is set in a flip down lid which locks into place during transportation and protects both screen and drives. A carrying handle doubles as an adjustable tilt stand.

The rear panel carries all input and output ports, main fuse, IEC mains input and monitor controls. I/O ports can also be blanked off to stop dirt getting in.

Prices range from £1,200 for the standard model, £1,850 for high resolution colour and upwards depending on specifications.

A self assembly housing unit and a 12 volt model are available.

After Pagemaker, Magazine Maker

ADVANCED Memory Systems of Warrington and Watford Electronics have combined the AMX Pagemaker and Watford's Beeb Video Digitiser to create Magazine Maker.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used with AMX Pagemaker to illustrate magazines or newsletters, in fact anything that needs to be created on A4 size paper.

With Pagemaker's cut and paste, stretch, shrink, flip and zoom features, a variety of pictures can be composed, the only limit being imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

Text can be formatted around the digitised photograph on the screen using the range of facilities available.

These include 16 typefaces, character and pattern definer, text formatting and the ability to load in Wordwise and Viewfiles, plus a host of other features.

Once created the picture can be printed out.

Magazine Maker is suitable for any home, business or school use that requires illustrated documents.

"This is just the thing for every budding or established publisher", said Nazir Jessa, managing director of Watford Electronics.

Magazine Maker costs £105 from Watford Electronics.

Bank Manager on disc

ANOTHER company enhancing existing packages is Contex Computing. It has produced version 1.4 of its Bank Manager program for the BBC Micro with disc drive.

The program is used to record personal banking transactions, aids statement reconciliation and analyses expenditure and income.

The new version costs £17.50, but existing users can upgrade for £3.50 on return of their disc.

PROGRAMS GALORE FOR MASTER 512

THANKS to Acorn's selection of the Digital Research DOS Plus operating system and Gem graphics user environment, its new 16 bit Master 512 is fully DOS 2.1 compatible.

This means that users of the machine, particularly those in education, will be able to choose software from a vast library of existing professional and business programs.

Software choice is further broadened by the ability of DOS Plus to support all CP/M applications.

The Master 512 has been bundled with Digital Research's Gem collection, comprising Gem Desktop, Write and Paint.

Desktop is an icon-based system for managing files and communicating with the operating system, replacing unfriendly DOS commands.

Write is a word processing package offering full text editing facilities.

Paint is a freehand painting package for the creation of simple line drawings, cartoons, stylised illustrations or "oil" paintings.

The Master 512 includes an Intel 80186 co-processor, has 500k memory and the option of dual floppies or hard disc, and comes with a mouse and two colour, high resolution monitor.

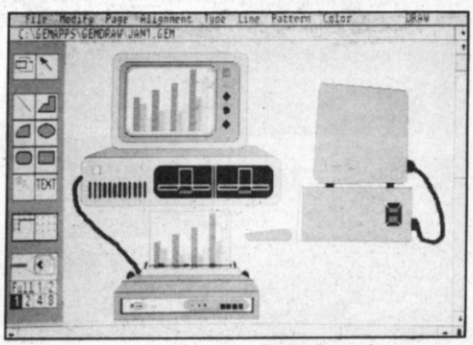
Paul Bailey, Digital Research vice-president, told *The Micro User:* "Acorn's decision to use DOS Plus on the Master 512 brings our newest operating system into centre stage in an important market sector.

"Acorn was looking for a compact, DOS compatible operating system and a user-friendly interface. The combination of DOS Plus and Gem more than fits the bill".

Acorn managing director Brian Long said: "We wanted to capture the enormous range of DOS-based applications in the market with the Master 512.

"The Digital Research solution DOS Plus offers the right combination of features for the market we are aiming at, and could also be put into ROM, which is a very attractive option for the future.

"We felt it was important to give our machine a graphics interface in order to maximise its user appeal, and Gem is already well established in the marketplace".



Gem Draw, from Digital Research, can be used to create plans, layouts, diagrams and flow charts

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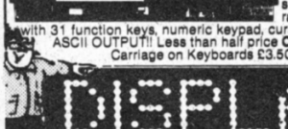

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Datastar modem deal

DATASTAR Systems has signed an OEM agreement with modem manufacturer Kirk Automation giving it exclusive rights to the technology marketed by DataStar under the name Magic Modem for the BBC Micro.

DataStar has linked the multi-standard Magic Modem with the latest terminal software, Commpanion, which has been nominated as Best Communications Software of the Year in the British Microcomputing Awards. It costs £115.

Repton 2 tops poll

STRATEGIC treasure hunt-cum-jigsaw puzzle Repton 2 from Superior Software has won the title Best BBC Game of the Year for 1985.

The award was decided by a poll of readers of Computer Gamer magazine.

Repton 2, which features in a special subscription offer in this month's issue of *The Micro User*, beat Revs, from Acornsoft, into second place in a close-run race.

Third was Knight Lore, from Ultimate.

Box for education

THE Box of Treasures, a new release from 4Mation Educational Resources for the BBC with disc drive, is intended to be just that.

It contains an adventure of the same name, a word processor for creating stories, a processor for creating forms, a graphics design program, Make-A-Box, a 60 minute story tape, six booklets of information, poems and examples and help cards.

The company says the material can be used as the core for a lengthy project on the theme of boxes, or the individual items for all manner of curriculum related activities.

Price £23, or £30 for the 3in disc version.

BBC Micros are working flat out – for the BBC

HUNDREDS of BBC Micros are in use throughout the British Broadcasting Corporation, and they are so easy to adapt that a cornucopia of specialist software has been devised for them.

The problem is nobody knows exactly how much. There is no record of the programs written by and for the broadcasters.

Jim Day, design engineer responsible for the BBC Micro, says: "We have no idea what people are up to.

"So many employees of the Corporation are computer literate now, and the BBC Micro is so simple to use, that they just get on with it without telling us what they are doing".

One of the BBC Micro's greatest champions at the Corporation is John Radcliffe, head of the Open University Production Centre, who was involved in the development of the first machines when he was executive producer in the computer literacy project.

He now has two BBC Micros – one at home and one at work – and uses them constantly, saving vast amounts of work for his secretary, Claire Sibley.

She explained: "John uses the micro to prepare everything he writes. He will come into the office with a disc with all his work from the night before, and I just get it printed up.

"Without the micro as a word processor I would need the help of another typist".

At the Open University Production Centre micros are being installed and programmed as terminals for the main computer.

The idea is that they will give managers simple access to administrative data, in the way that other BBC Micros are already used to gain access to the vast stores of information on the Open University computer system.

A similar scheme at Glasgow will give BBC Scotland low-cost terminals to the BBC's central computers.

One of the main uses of the BBC Micro at the Corporation is putting captions, maps and graphics on the television screen.

The technique was developed by engineering investigations under John Mitchell, and involved developing a device that "gen-locks" the micro signal with the TV signal.

Other members of staff have written their own programs to store such information as special lettering for use in captions.

Peter Armstrong, now working on the Domesday Project, wrote a program called Prompt which enabled him to cost his programme-making, calculate expenses and keep track of spending on particular projects.

The production team of the TV computer show Micro Live use the BBC Micro behind the scenes and in front of camera. They have programmed micros to transfer word processed material through electronic mail.

"It means we can work from home", says Steve Lowry of Micro Live. "We can write the script and send it to each other via electronic mail and compare notes".

The logos illustrating this article were produced on a BBC Micro by the Information Design Unit of the BBC. All the peripherals are standard off the shelf add-ons building the micro into a flexible graphic aid.

It is mainly used at the ideas stage of a project. After inputting data or drawings the screen image can be manipulated in an infinite number of ways – changing colours, texture, size and distortion.

OFFICE SYSTEM BASED ON BBC

A NEW office system based on the BBC Micro has been released by Solidisk.

Called Wordchic, its entry system consists of a 160 character a second dot matrix printer with near letter quality and graphic capability, 640k Mitsubishi disc drive and, from Computer Concepts, a double density disc filing system and Wordwise Plus.

Also included in the package are spelling checker, database, spreadsheet and games.

The system provides a RAM/ROM add-on and will hold up to 500k of ROM and four megabytes of RAM, and a suite of professional integrated software. Price: £355.

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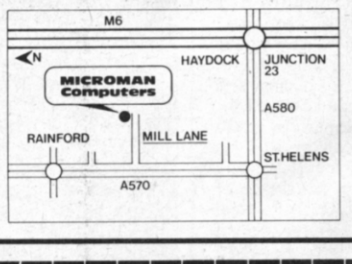


but manage to control the spin it is quicker in real terms to crash the car than to mess around trying to get back on the track.

If you come off simply depress one of the gear change keys, hold in the clutch and hit the accelerator before releasing the clutch. The car should leap forward and crash.

After crashing many people frantically hammer the Tab key to change down to neutral for the restart. This is time-wasting and unnecessary. The fastest way to get moving again is to press Tab, S and T together, releasing Tab when the rev counter reaches 5000 and then change down to first gear.

When you move up to the amateur level this technique goes out of the window since crashing terminates your race. So if you're planning to become a professional driver you will need to learn to control a crashing car.

If you come off the track on to a high curb the car will leave the ground completely and you will crash. There is very little you can do to rectify the situation except not to do it in the first place.

If you leave the track on a straight or while overtaking or through being pushed off, just make slow gentle moves to get back on to the track. You will notice very clearly here the difference in grip between the grass and the track. If you panic and turn sharply you will simply spin the car.

If you come off over a low curb change up to fifth gear and release the accelerator. Now find that brake key, A, and repeatedly tap it until the rev counter comes down to 2500. When this happens drive slowly back on to the track. Do not ever hold the brake down – you will only succeed in skidding the car beyond control.

If you do spin release the throttle and change into fifth immediately. Tap the brake as above and hope. It was said earlier that sustained braking causes skidding, but when in a spin if all else fails there's nothing to lose, so lean on the brake.

One thing to note is that sometimes the flaps are damaged in a crash, so after a crash or bump move the car from side to side and if the steering seems a bit sloppy press Shift + f0. This will take you into the pits where you can reset the flaps.

But don't worry. As soon as you enter the pit everyone else stops until you are back on the track.

Finer Points

ALTHOUGH you will be busy just trying to drive a good race, it is worth looking out for some of the finer points and added touches which give Revs its realism.

For example, when you hit the throttle inertia lifts the front of the car and on braking the nose goes down just as a real car would. It is this which makes Revs the best racing car simulation ever produced for the BBC Micro.

Keep Revvin' 'cos practice makes perfect!

THE MICRO USER

Guide to playing...

By
Revmasters Lee Varga and Clive Packer

The Silverstone circuit awaits...

FOR all those drivers who dream of winning a race here's how to beat Max Throttle at his own game without really trying. Let's start by loading in the game.

Revs can be played with the keyboard (Shift + f1) or joystick (Shift + 2). Beginners may have found that the game is easier to play with the joystick. This is true to start with, but once you gain experience a keyboard gives better results. In this guide we are going to concentrate mainly on the use of the keyboard.

So settle back into your seat and grasp the steering wheel or, to put it another way, position your hands on the keyboard as shown in Figure I.

As a clever and attentive reader you will have spotted at once that there is no finger on the brake key, A. (What do you want to slow down for, you're trying to win the race?) The reason for this is that braking is only needed in emergencies. For those joystickoholics who still insist on playing with a joystick, grasp it as you would normally and read on.

The Ralt 3 racer is controlled like this: car left is L or stick left, car right is + or stick right. Accelerate is S or stick forward and brake is A or stick backwards. Change up a gear is Q or stick fully forward and push the fire button while change down a gear is Tab or centralise the stick and push the fire button. In either mode the spacebar amplifies the steering and T starts the engine. In joystick mode the fire button acts as the clutch.

The controls

When using a joystick you must slide the stick gradually in the desired direction. If you yank the stick over you will skid and spin all over the place. If you are moving fast and brake rapidly by jerking back the stick you will also skid, spin and crash. Try it.

Okay, so you're ready to go. Well not quite, there are still the pit adjustments to make to your car. Start by selecting the practice option (1) then set the rear flaps to 25 and the front to 16. These are the best settings for handling and performance.

You will now find yourself alone on the where you started. Having come out of the previous corner on the left hand side of the track move over to the right. When you pass the red marker of the next corner simply move in to the left – no need to change down or brake here – and whoosh round the corner at full speed, moving out to the centre of the track before exiting.

Now move back to the left hand side because folks it's back to the chicane situation, so start again at the beginning of the text.

That concludes the step-by-step guide to the Silverstone circuit, but make sure you have memorised the map thoroughly.

The race is on!

WHEN you have mastered the circuit you will want to try your luck in an actual race. It is imperative that you start by entering a novice race.

The qualifying laps are just like driving in practice mode but watch out for other cars. The thing that must be stressed here is that all the other drivers are blind. This is because they are simply trying to get the fastest lap time and will not let a small thing like another car get in their way.

They drive the same path around the curves every time and if you're in the way – well you won't be much longer. After qualifying, with luck you should be fairly well up the grid with not too many cars in front of you.

When you are given the signal from the lights spin the wheels and go!

Carefully weave in and out of the other cars, gradually moving over to the right of the track. The other cars will bunch into groups on the left, with gaps in between. Move into one of these gaps as you near the chicane and hang on the tail of the guy in front.

If you hang back too much you will be rammed from behind and crash.

As the manual states, in novice racing even the worst pile ups are catered for. This means, in effect, that there is always a crane ready to lift your car back on to the track after you've ripped the catch fencing to pieces.

It is worth noting here that in the higher racing levels the crane operators go off for a tea break the moment you set wheels on the grid, so if you crash it's the end of the race for you.

In the novice race if you slide off the track

Wings

THE best wing settings are 25 and 16. These settings were found after much time, energy and above all, crashing. When you are used to them and can drive a mean lap try changing them to 20 and 14.

This tends to be a bit on the spongy side around corners, so freewheel into all curves from the second marker to the red marker, but on the straight sections the car will fly.

pull over to the left when you see the red marker. You will glide through the bend on to a short straight.

The next thing is the hairpin so SLOW DOWN. Move to the left of the track and at the second white marker take your finger off the throttle, change into fourth gear and start the right turn. As you pass the red marker cut in hard right. You will move to the right curbing and you should now change down to third gear.

Momentarily release the steering then move right again with amplification if you are too far to the left and press the throttle again. You should brush the left curb but release the steering a few moments before this as the wheel takes a while to centralise and this should be sufficient to keep you on the track.

Continue to accelerate as you move into the straight and build up to fifth gear again. The last part of the hairpin section is another gentle left which you can glide through in top gear at top speed.

We now come to the long straight. This is the chance to really put the car through its paces so floor the accelerator and see what it can do. Move gradually over to the left of the track ready for the next curve, which is a right.

As you pass the red marker turn into the corner across the inner curbing and give the steering a touch of amplification. Release the steering slightly before hitting the outer curb to allow it to centralise and you should slide out of the curve facing down a short straight.

Nearly round the track now, so don't blow it. Move to the left in readiness for the coming right hand turn. Just before the red marker, change down and start the turn holding the + key down to keep the wheel turning as you enter the bend.

When you hit the inner curb release the steering and accelerate out of the curve. You should come out of the corner reasonably fast, just touching the outer edge of the track. If you don't make it round this corner the chances are you're not steering hard enough, so try again – you must hit the inner curb to get safely round this one.

All that's left now is a straight followed by a gentle left before entering the straight

Qualifying and Timing

IN the novice race it is best to get a qualifying lap time of between 1:30.0 and 1:30.5. If you take longer than 1:30.9 it isn't really worth racing because you start off in the middle of the grid and get squashed and rammed when the pack goes round the first bend.

If you get a lap time faster than 1:30.0 everyone moves up a league and – yes you guessed it – you're back in the middle of the pack.

As a beginner it's pointless trying to enter the professional race to see what it's like, because if you don't get 1:26.0 or faster you will be dumped back into the novice race.

track at Silverstone. Before you get all excited and zoom off in a cloud of black evil-smelling smoke it might be a good idea to start the engine. To do this hold down Q, S and T simultaneously. These keys hold in the clutch, depress the accelerator and operate the starter in that order.

When you do this you will find that the car leaps into life, the rev counter starts to move and the engine sound fills your ears. When the rev counter reaches the 5000 mark release the clutch by letting go of the Q key. You should hear the squeal of a wheelspin start. This is not strictly necessary but it gives you a good feeling and can be useful when it comes to starting a real race. Now you are moving!

Keep the car in first gear and drive SLOWLY round the track. Take a good look at the circuit as you go and learn the shape of the curves.

On the Silverstone track there are four corners, a chicane and a hairpin. Have a close look at all of them now because you won't be able to drive and read this at the same time unless you happen to be Zaphod Beeblebrox. You might find it a good idea to

Facts and Figures

THE engine of your Ralt 3 car has only one power band. This gives the engine its maximum power between 5000 and 5600 rpm. It is therefore vitally important to keep the rev counter between these values by being in the correct gear for the speed you are doing.

Figure I: Hand positions on keyboard

have the map (Figure II or from the Revs manual) handy as well.

During the qualifying lap, and in practice mode, you start from point X. This gives you plenty of time to build up speed before passing the start line, which is where your lap timings are taken from.

The position of the start (Y) means that you will need to exit the chicane as fast as possible. With practice this can be done in fifth gear with revs around 5300 (smug smile). By the time you have finished what you're reading now you will probably have crashed at least once.

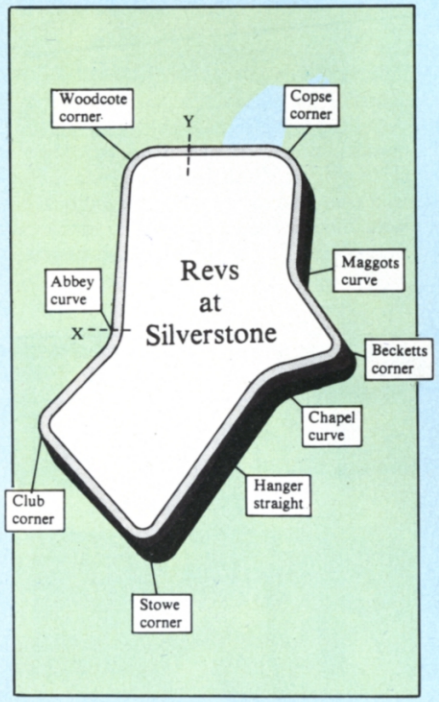


Figure II: Silverstone map

In practice mode when you crash your car it is deposited back on the track at point X. So when you crash just begin again by starting the engine, holding down Q, S and T . . .

Keep practising in first gear, getting the feel of how the steering responds to the keys, until you can make it round the whole circuit every time without going off the track. You might get a trifle frustrated, but this really is the only way to become a good driver, so be patient.

When you can handle the car accurately at a slow speed it is fairly straightforward to build up the speed without too many mishaps. Simply remember that you will have to respond earlier with the controls.

Now start again from point X and move off. As the rev counter reaches 5600 move up a gear (Q). Remember your engine has maximum pulling power in the range 5000-57000 rpm. By the time you approach the chicane you should be in fifth gear.

The Chicane

You will next see the sign warning of the chicane which is followed by two white markers on the left hand side of the track. After the two white markers there is a red one. When you pass this move over to the left hand side of the track while releasing the throttle and changing down to fourth gear.

Cut in to the right. The car will move across on to red and white curbing on the right hand side. As you approach this curb release the steering momentarily, which maintains the steering at a level which will stop you going into a spin.

Although you can cut across the curbing in the chicane and at all the other corners, don't use the curb too much, otherwise your car will tend to take off which does not encourage responsive steering. As you pass the curbing on the right, turn to the left until you pass another red marker on your left, when you should steer right again.

You should steer across more curbing to the right before exiting the chicane on the left side of the track. You probably find this hard to visualise, so look at the plan view (Figure III), which might help to clarify things a little for you.

If you don't make it through the chicane the first time you try it, and you probably won't, don't panic. Just count to ten and do it again – in a lower gear if you like.

As in most things, practice makes perfect. The chicane is one of the most difficult things to master on Revs so stick at it until you can get through at a good speed without crashing. When you do you will find yourself on a short straight. Halfway down here is a flag on the left side of the track. This is the starting line.

The first corner after the start is a pain, being a fairly sharp right. Approach on the left side of the track and watch for a red marker. As you pass the marker change down a gear, release the accelerator, turn right holding the + key down until you cut across the curbing on the right.

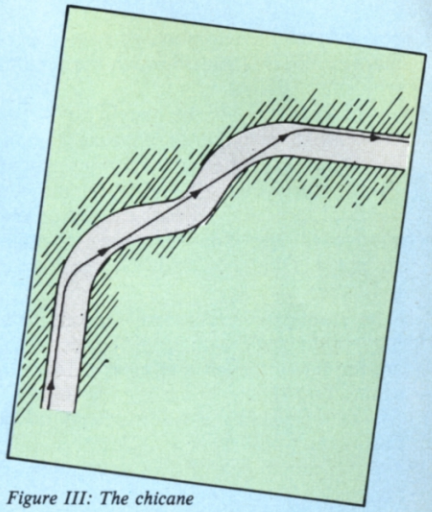
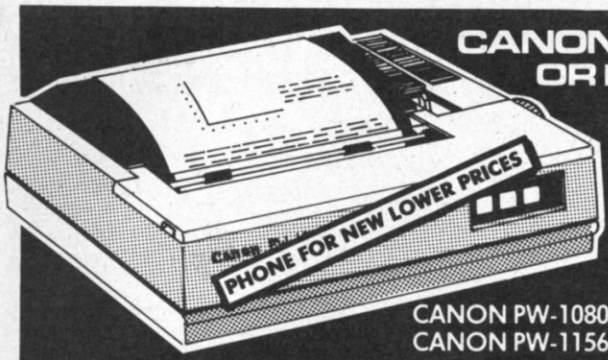


Figure III: The chicane

Now release the + key. The car will slide over to the left of the track, and you will need to press the + key again together with the steering amplification (spacebar), to stop the car sliding off the track on to the left hand curbing. When you are through the bend move quickly to the right.

You now enter the hairpin section. This consists of a gentle left turn followed by the hairpin, which is a right then a gentle left again. The first curve is easy to handle in fifth gear with the pedal on the floor. Simply



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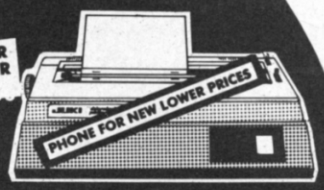

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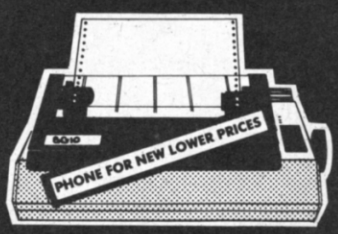

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- JX80 Colour **£420**
- Brother HR15 **£285**
- Sakata Plotter **£139**

SOFTWARE (ROMs)

- Watford DFS Kit **£48**
- Acorn DFS Kit **£47**
- Watford DDFS Kit **£45**
- Watford DDFS + **£22**

ACORN's ROMs Packages

- BCPL **£44**
- ISO PASCAL **£42**
- LISP **£34**
- VIEW 2.1 **£39**
- VIEWSTORE **£39**
- FORTH **£32**
- LOGO **£42**
- TERMULATOR **£24**
- VIEWSHEET **£39**

Miscelleneous ROMs

- ACCELERATOR (CC) **£42**
- ADE (SY) **£38**
- BEEBFONT (WE) **£23**
- BEEBMON (WE) **£22**
- BUFFER/BACKUP (WE) **£17**
- COMMSTAR (P) **£24**
- COMMUNICATOR (CC) **£47**
- DATAGEM (G) **£49**
- DISASSEMBLER (WE) **£15**
- Dumpout 3 (WE) **£22**
- Epson NLQ (WE) **£22**
- FILE-PLUS (WE) **£28**
- GRAPHICS Rom (CC) **£23**
- INTERSHEET (CC) **£39**
- INTERCHART (CC) **£26**
- LOGOTRON LOGO (L) **£55**
- MUROM (BB) **£23**
- SLEUTH (WE) **£22**
- NLQ DESIGNER (WE) **£22**
- ROM-SPELL (WE) **£22**
- ROMAS (WE) **£42**
- ROM MANAGER (WE) **£18**
- TOOLKIT + (BB) **£29**
- TRANSFER ROM (WE) **£22**
- ULTRACALC (BC) **£48**
- WORDWISE (CC) **£28**
- WORDWISE + (CC) **£39**
- WORD-AID (WE) **£17**

DISC SOFTWARE

- AMX DESK **£18**
- AMX UTILITY **£11**
- AMX Educational **£20**
- DIAGNOSTIC DISC (WE) **£17**
- DISC EXECUTOR ..... (WE) **£9**
- INVESTIGATOR (WE) **£17**
- Office Master (G) **£19**
- OFFICE MATE (G) **£10**

5¼" DISCS

Lifetime warranty on Discs

(In Plastic Library Cases)

20 × S/S D/Density 48TIP **£18**
20 × D/S D/Density 48TPI **£23**
20 × D/S D/Density 96 TPI **£30**

(In Lockable Storage Units)

50 × S/S D/Density 48TPI **£48**
50 × D/S D/Density 48TPI **£66**
50 × D/S D/Density 96TPI **£74**

PERIPHERALS (incl. Software)

16K Disc RAM **£28**
16K Sideways RAM Module **£27**
32K Shadow Ram Board **£54**
Sideways ZIF Socket **£14**
Solid State 16K Sideways RAM **£26**
Solderless Sideways ROM Board **£30**
Watford ROM/RAM Card 32K **£42**
Watford ROM/RAM Card 64K **£64**
Watford ROM/RAM Card 128K **£99**

EPROMs for BBC's Sideways ROMs.

2764-250nS £1.85
27128-250nS £2.55

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

6264LP (8K) £3.50
2 × 6264LP (16K) £6.70

BBC MICRO WORD-PROCESSING PACKAGE

A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in at our retail shop to discuss your particular requirement and a demonstration.

EXAMPLE PACKAGE

BBC B Plus (64K) Micro; Wordwise Wordprocessor, Twin 800K Double Sided Mitsubishi Disc Drives, Zenith Hi-Res Green Monitor, Brother HR15 professional quality Daisy Wheel Printer, Gemini Database, Spreadsheet, Beebplot Graphics, Accounts Pack: (Cashbook, Final Accounts, Mailist, Easiledger, Invoice & Statements and Stock Control) Software packages on Disc with Manuals.

NEW LOW PRICE

Only £999

THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX/KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, Canon PW1080A or any Epson FX80 compatible Printer with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

Superb Value at **£5.95** (No VAT)

MARK II LIGHT PEN

You no longer have to fiddle with the brilliance control or work in the shade as this NEW Mark II Light Pen is totally insensitive to local lighting conditions. It only operates on high frequency light from the TV or Monitor.

The red LED Indicator on the Mk II pen, lights up when valid video data is available. Your program can have access to this signal allowing computer verification of target for high res drawing. The conveniently located switch on the pen body allows the computer to ignore any stray signals. Supplied complete with the sophisticated PEN-PAL Software on Cassette or Disc. Please specify.

Mark II Light Pen **£25**

Continued

The ULTIMATE DFSs for the BBC MICRO

WATFORD TOPS THE DFS CHART

Watford's Ultimate DFS has scored highest points in ACORN USER's unbiased DFS's Review of July 1985.
In concluding, the reviewer writes "It must be said that Watford's DFS certainly offers a comprehensive range of facilities at a very attractive price". (Please write in for comprehensive details.)

Just compare the features:

Features	Acorn 1.20	Watford Single Density	Watford Double Density
Max nos. of files per disc side	31	62	62
Max disc capacity	800k	800k	1440k
Tube compatible	Yes	Yes	Yes
Built-in Editor	No	Yes	Yes
Built-in Formatter	No	Yes	Yes
Built-in Verifier	No	Yes	Yes
MRUN a file	No	Yes	Yes
MLOAD a file	No	Yes	Yes
Extended RENAME	No	Yes	Yes
Selective COPY	No	Yes	Yes
Default file name	No	Yes	Yes
Disc space distribution	No	Yes	Yes
40/80 Software Switchable	No	Yes	Yes
Wide catalogue	No	Yes	Yes
Close open files	No	Yes	Yes
Improved OPENOUT	No	Yes	Yes
Copy between densities	N/A	N/A	Yes
OSWORD &7F	Yes	Yes	Yes
Full entry point compatibility	Yes	Yes	Yes
Retain information over a break	1.20 partial	1.43 Yes	1.53 Yes
Games compatibility	Yes	Yes	Most
Econet file server	Yes	Yes	Yes
Econet station	Yes	Yes	Yes
Full wildcard facilities	No	Yes	Yes

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for three years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. (P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS).

PRICES

- *Complete Disc Interface Kit incl. DFS ROM & fitting instructions* **£59**
- *Acorn's DFS Kit complete* **£59**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**
  (P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs)
- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£16** ● *ADFS ROM only* **£25**
- *Watford's DFS is exclusively available from Watford Electronics. Every ROM carries a special label with our LOGO and serial number.*

WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these!

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

- *Complete DDFS Kit incl. fitting instructions* **£58**
- *DDFS Manual* *(no VAT)* **£6.95**
- *We will exchange your existing Single Density DFS Kit for our DDFS Unit at* **£35**

Watford Electronics DDFS PLUS for the BBC B Plus

Watford Electronics was the first company to produce a serious alternative Disc Filing System (DFS) for the standard BBC micro. Since then, we have been refining and advancing this sophisticated product right up to today.

Now WE'VE DONE IT AGAIN; Watford proudly presents the Double Density Disc filing system for the BBC B+, with all the advantages of the advanced Watford DDFS available on the new BBC B+ DDFS.

Acting as a powerful alternative DFS to Acorn's '1770 DFS' supplied with the BBC+, this superb addition to any BBC+ greatly enhances it's performance with a simple fitting operation.

DDFS PLUS incorporates all the features of the Watford's popular DFS & DDFS for the BBC B, (at the same time retaining full compatibility with Acorn DFSs), plus it has the following extra features:

Automatic density selection – Full single and double density operations – Extremely powerful and comprehensive OSWORD &7F emulation – Any file can be full size of disc – Density of last access assumed for speed – Automatic 40/80 stepping swapped on error – All Acorn's extra disc commands implemented.

As you can see from the above information, Watford's DDFS for the BBC+ is far more sophisticated and well thought out than the standard. Take any disc produced by any Watford DFS from the standard BBC and catalogue straight off with no problems.

Unlike the Acorn 'ADFS', our DDFS+ system is just as easy to use as the standard DFSs, with no new complex concepts to have to learn. The features within our DFSs have been constantly enhanced over a period of three years during the time that they have been released; significant attention has been paid to feedback from our customers so that the features offered are carefully honed to the requirements of hobbyists and serious programmers alike.

The Watford DDFS+ is supplied with a comprehensive DDFS manual that explains the basics of disc drives, DFSs, etc. Priced at only £30 including the manual, the Watford DDFS+ is surely one of THE best buys you could make for your BBC B+!

Join the leaders in BBC peripherals; join Watford Electronics – committed to supporting the BBC micro.

DDFS PLUS (for BBC Plus) **£30**
(Price includes comprehensive manual)

COPY HOLDERS

How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in desk resting and shelf clamping versions, these two units hold your paper firmly by means of a magnetic ruler and a clip grip.

Mounting to a convenient flat surface, the two joint anglepoise Manuscript Holder allows the paper to be positioned at virtually any convenient angle whilst only taking up a fraction of the surface area that the paper being held does.

The smaller desk resting Manuscript Holder is useful for the more organised desk where the problem is simply holding the paper at the right angle.

Whatever desk arrangement you use, surely you deserve a Watford Manuscript Holder!

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£17** *(carr. £3)*

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track and which are 80 track. The 40 track ones are manufactured by EPSON, the world famous Japanese company, (non-tinted boxes). The 80 track drives are famous MITSUBISHI drives (tinted boxes).

With two prices in a box (e.g. £295/£299), the first price is for the standard drive and the second for the same unit in switchable type. Users of either of the two Watford DFSs will not need switchable drives as their DFS will provide software switching for them.

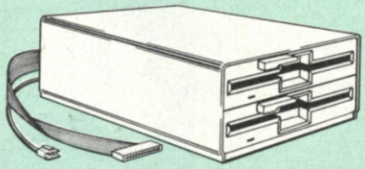
All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. *Extensive experience of the usage of disc drives suggests that the MITSUBISHI and EPSON drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality Epson and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate: extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. (Ideal for Schools & Colleges. All single disc drives with power supply, (i.e. CS100, CS200 & CS400S) are supplied in a twin case with twin data cable for later inclusion of a second drive). At Watford we anticipate your needs of tomorrow not just today!

When using a BBC Micro, most people find themselves preciously short of space. The Watford's BBC Micro Plinths form an ideal way of recovering some of this space; your BBC, disc drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. Some of our competitors offer disc drives built into plinths, but these aren't as sensible as you might think. With a Watford Plinth, your disc drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen and paper, reference manuals, etc. Follow the trend with Watford Plinth.



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
100K (180K)	CLS100 £76		CS100 £89	
200K (360K)	CLS 200 £76	CLD200 £140	CS 200 £89	CD200 £145
400K (720K)	CLS 400 £80 / £83 CLS400S	CLD 400 £140	CS 400 £100 / £103 CS 400S	CD400 £145
800K (1.44M)		CLD800 £162 / £165 CLD 800S		CD 800 £179 / £186 CD 800S

- TWIN Disc Drive Case, complete with Power Supply & Cables **£35**
  Securicor carriage on Disc Drives £5

Prefix **C** = *Cased Drive*
L = *Less PSU*
S = *Single*
D = *Double*

Suffix **S** = *40/80 Switchable*

e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).

MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

£5.95 (Book No VAT)

3M – DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

- *10 × 5¼" S/S D/D 40 Track Diskettes* **£12**
- *10 × 5¼" D/S D/D 40 Track Diskettes* **£15**
- *10 × 5¼" S/S D/D 80 Track Diskettes* **£22**
- *10 × 5¼" D/S D/D 80 Track Diskettes* **£22**

- *10 × 3½" S/S D/D 40/80 track Discs* **£25**
- *10 × 3½" D/D D/D 40/80 track Discs* **£35**

TOP QUALITY 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

- *10 ×* **M4** *S-S D/D 40 Track Discs* **£11**
- *10 ×* **M5** *D/S D/D 40 Track Discs* **£14**
- *10 ×* **M7** *D/S D/D 80 Track Discs* **£19**
- **3**" *Double Sided Discs* **£4** *each*

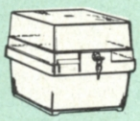
DISC ALBUMS

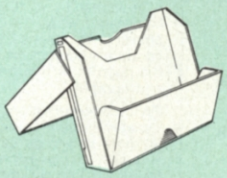
Attractively finished in Antique Brown, leather look vinyl. Stores upto 20 Discs. Each Disc can be seen through the clear view pockets. **£4**

LOCKABLE DISC STORAGE UNITS

Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

M35 - holds upto 40 discs **£9**
M85 – holds upto 95 discs **£12**





PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE
holds 10 Discs. **£1.80**

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use.

£8

DUST COVERS (For our Disc Drives)

Single (without PSU) **£3.20** Twin (without PSU) **£3.85**
Single (with PSU) **£3.95** Twin (with PSU) **£3.90**

EPSON NLQ ROM

for the BBC Micro

Harness the full potentials of your Epson RX & FX Printers. Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £25

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00

THE NLQ DESIGNER

KAGA KP819/910 and Canon PW1080 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! For the BBC Micro. This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on. Downloadable Fonts require 6264 RAM chip fitted.

A 40/80 track format disc containing 3 example fonts is included in the package.

(P.S. This ROM is not suitable for Epson printers as they don't normally have NLQ ability. Keep reading our adverts though – work is in development!)

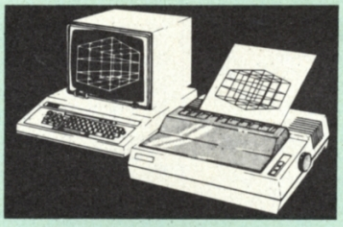
- NLQ Designer ROM & FONT Disc **£25**
- Kaga Individual FONT ROMs **£15**

Now available:

- Centronics GLP Printer NLQ Designer ROM **£20**
- GLP Individual FONT ROMs **£14**

(Write in for further details on both).

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

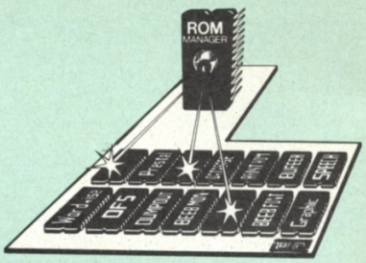
"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £25 it must represent excellent value for money and surely cannot be beaten".

Designed for use with the following printers:

CP80, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, LPVII, NEC PC8023, DMP100/200/400, Mannesman Tally etc.
Price including comprehensive manual

£25

ROM MANAGER



Probably the most powerful way of expanding the BBC micro is from the use of Sideways ROMs. One problem faced by the avid ROM collector is that of ROM command clashes. The solution is very simple in the form of the ROM that "Provides comprehensive management of all your installed ROMs". (Quote from BEEBUG November '84.)

Basically, ROM Manager offers you the ability to turn off any installed ROM, or to send any * command to any specific installed ROM. It is said that imitation is the sincerest form of flattery – Acorn's BBC Plus features many of the abilities of this powerful ROM.

Many more facilities available.

SPECIAL OFFER £18

BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software. It allows you to display text on the screen in 13 different styles. It is supplied complete with a Spooler and Editor on 40 or 80 track disc.
(Please write in for technical details).

ONLY **£25**

BEEB PRINTER ROM

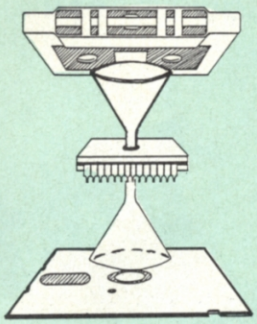
This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:

★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.
★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.
★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.
★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.
★ Commands select the options for the following printers:
GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.
Operates with either parallel or serial interfaces.
★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

Price: £25

TRANSFEROM

(Tape to Disc Utility)



The only TAPE to DISC Utility ROM that works with our Double Density Disc Interface.

After months of top secret development, we are now able to supply details of this advanced and sophisticated utility ROM for the BBC micro. Just look at the features:

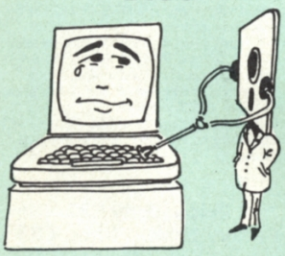
- Fully menu driven for ease of use
- Copes with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required – Single or Double Density.

£25.00

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

Continued

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!

ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8
P.S. This includes the Acorn 6502 & Z80.

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referancer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

The Macro Editor

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes a comprehensive manual, providing detailed documentation and plenty of examples.

A give away at . . . **Only £45**

Please specify 40 or 80 track disc when ordering.

ADE

'Systems' complete program development package in a 16K ROM. We are now supplying the new 6502 2nd processor compatible version.

SPECIAL OFFER ONLY **£34**

ULTRACALC 2

The mark 2 version of the BBC Publications' extremely popular electronic spreadsheet ROM.

Only: **£66**

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

ROM-SPELL

"way ahead of any competition"

ROM-SPELL is probably THE most advanced and fastest spelling checker available for the BBC Micro. Printed below are some extracts from a recent independent review (A&B Computing Nov. '85), which we feel sure will convince you that this is THE only spelling checker worth considering.

"The editing system is very neat and simple, instead of replying to queries and beeps all of the time . . ."

"The other feature which places ROM-SPELL way in front of any competition is the ability to examine the user dictionary, so any spelling mistakes that have found themselves on the disc can be examined and taken out if necessary".

". . . that it is compatible with many of the popular word processors on the market is a good indication that ROM-SPELL is going to be a very popular product indeed".

". . . ROM-SPELL is by far the best spelling checker for the unexpanded BBC B (with or without word processor). It boasts features which are hard to find on conventional spellcheckers on CP/M and MSDOS, namely Spellstar and has a speed/performance ratio of roughly the same as its CP/M cousin. The difference is that the CP/M version would cost the best part of £500".

". . . and with such vital house keeping features as an ambiguous word checker, the ability to edit the user dictionary, a comprehensive manual that is both easy to read and actually ENJOYABLE to learn from, . . . I feel confident that ROM-SPELL will woo the word processing public with no problems at all".

Don't settle for less, Buy the best.

ROM-SPELL costs only **£25**

(Please state 40 or 80 track disc)

DISC EXECUTOR

Disc Executor is a sophisticated disc utility for the transfer of your programs from cassette to disc. It copes with 'locked' files and full length adventures (up to &6E blocks long) and programs that load below &E00. Disc Executor is simple to use and provides menus to prompt the user along the way. Disc Executor will cope with the vast majority of tapes. (Please note that Disc Executor is not compatible with double density disc interfaces – keep reading our adverts though!)

Price only **£10** (40 or 80 track)

BEEBMON

BEEBMON is the most powerful and versatile machine code monitor from Watford Electronics. BEEBMON offers some superb features specially designed to make the task of understanding and debugging machine code easier; indeed BEEBMON is probably the only product with sufficient power to aid in the debugging of such complex pieces of software as a DFS.
Offering a total emulation mode, BEEBMON can be used to single step through code anywhere in memory. All breakpoints are emulated and the workspace is totally relocatable, allowing for the simulation of all those "awkward" pieces of code.
(Write in for technical details.)

£24

DISASSEMBLER ROM

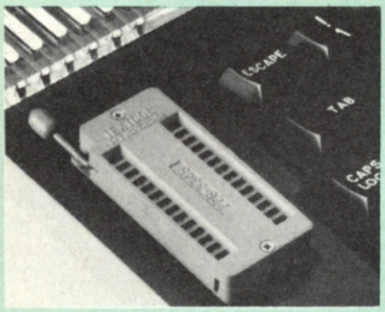
Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use progammers tool.

Please write in for technical details.

ONLY **£16**

Continued

SIDEWAYS ZIF SOCKET



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space, simply unplug the ROM and plug in a different one. It is a real must for Professionals and Hobbyists alike.

ONLY **£15**

16K Sideways RAM Modules

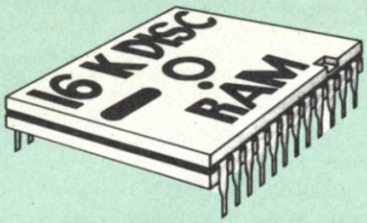
This is it! The revolutionary design RAM Module you've been waiting for. Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Works with any ROM.
- Ideal for professional software development.
- Supplied with utilities software disc.

Introductory offer: **£29**

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**



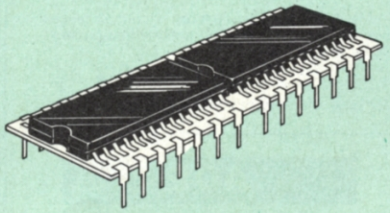
This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

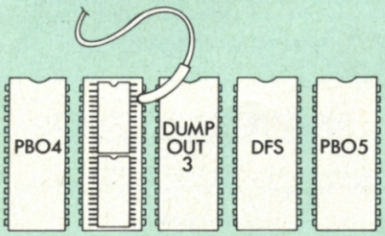
- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- All existing ROMs can be stored on disk and used in DISC RAM.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £30

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

SOLID STATE 16K SIDEWAYS RAM

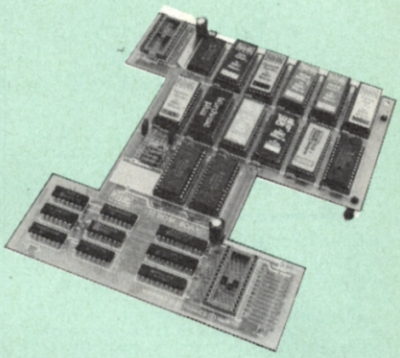




This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead to fit, (no soldering required) this compact unit works with any BBC Micro with or without a ROM board. Compatible with BBC B Plus. Like our other 16K RAM Modules, this unit is very simple to fit.

Only **£28**
Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16. Also permissable, are various configurations of RAM (up to 16k) and different sized EPROMs (see below).

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 can take the following chips: 2716, 2732, 2764, 27128, 6116, 6264.
- Auto write protect for RAM chips.
- Read protect to make RAM "Vanish"; allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£35**

EXTERNAL Sideways ROM BOARD

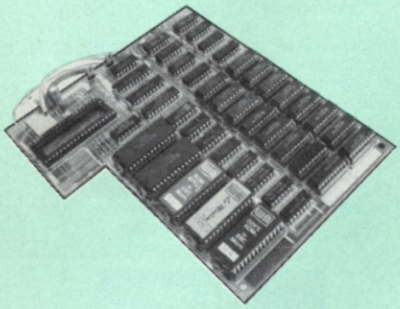
This extremely versatile 12 ROM Socket Board is supplied with power supply, boxed in an attractively finished BBC beige. A second board can be fitted at a later stage to give a total capability of 28 ROMs.

- No soldering required.
- Easy access to ROMs.
- Does not physically interfere with other internal add on boards.
- Built in power supply.
- Write protect for RAM.
- Allows upto 32K Static RAM and 24 ROM Sockets in varied combination.

Price: **£75** (carr **£3**)
(2nd Add-on Board **£30**)

Watford ROM/RAM CARD

A must for all serious users



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with ALL BBC micros (not BBC Plus).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Write protect for ALL RAM.
- Master write protect for all sockets.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Can run ANY BBC ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM/RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM/RAM Board.

The ROM/RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, should the user wish to upgrade in the future. Please write in for further details.

INTRODUCTORY PRICES:

ROM/RAM card with 32k dynamic RAM	**£45**
ROM/RAM card with 64k dynamic RAM	**£69**
ROM/RAM card with a massive 128k dynamic RAM	**£109**

OPTIONAL EXTRAS:

16k plug-in Static RAM kit	**£9**
Battery backup	**£2**
Read and Write protect switches	**£2**
Complete ROM/RAM board (all options installed)	**£125**

Le Modem

PROHIBITED from direct or indirect connection to any telecommunication system run by British Telecommunications. Action may be taken against anyone so connecting this apparatus.

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World/wide data transfer system.*
- *Auto Dials, Auto Answers, Auto Baud selects and is completely controlled by your Micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELESOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple *COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON/OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*

- *BT Approval applied for.*

Price: **£89** (carr £3)

(Price includes Software ROM, Cables and Manual)

Nightingale Modem

SPECIAL PRICE to our Customers

£119

(Price includes COMMSTAR ROM & comprehensive manuals)

Nightingale Modem without software	**Only £99**
COMMSTAR ROM package only (P&P on modem £2.00)	**£29**
Auto Dial/Auto Answer Board	**£48**
Auto Dial Utilities Disc	**£9.50**
OBBS Bulletin Software	**£20.00**

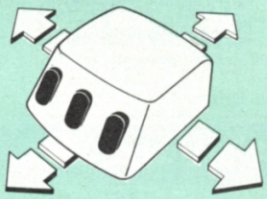
LOGOTRON LOGO

The popular Logotron Logo in ROM. Recommended by most Education authorities.

Only: £55

THE AMX MOUSE

The AMX Mouse needs no introduction. It is simply the best.



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £66.95

We are giving away the sophisticated **COLOUR ART** Software package **ABSOLUTELY FREE** with every purchase of the AMX Mouse from us.

AMX DESK Package	**£19.00**
AMX UTILITY Package	**£11.50**
AMX SUPERART Package	**£43**
AMX PAGE-MAKER Pack	**£43**
AMX 3D ZICON Disc	**£21**
AMX Database Disc	**£21**
AMX XAM Educational	**£21**

COLOUR ART

This novel program allows you to add COLOUR to any drawing produced with your AMX Mouse package, and really brings those pictures alive. Not with just any colours, mind you, but a full range from up to 255 different shades! It's simplicity itself to use this "painting by numbers" painter to create simple, striking and powerful images to please the eye.

Price **£10**

(please specify 40 or 80 track disc when ordering)

Versatile **BEEB SPEECH SYNTHESISER** Unit

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32

Continued

COMPUTER CONCEPT'S ROMS

ACCELERATOR	**£52**
CARETAKER Basic Utility	**£27**
Graphics ROM	**£26**
Disc Doctor ROM	**£26**
TERMI	**£27**
COMMUNICATOR	**£58**
SPEECH ROM	**£26**

Wordwise

The most popular Wordprocessor for the BBC Micro.

Special Offer: **£32**

Wordwise plus

£45

FREE FREE FREE

This month we are giving away absolutely FREE, the superb Word-Aid ROM worth £20, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text/segment area.

Only **£20**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS

Supplied on disc. This version requires a WORDWISE-PLUS ROM to be present in the machine. It gives up to 44k of text space on the 6502 2nd processor.

£5

Inter SHEET

The most powerful spreadsheet package available for the BBC Micro. Ultra-fast replication and calculation times help make this the easiest to use. It has received very favourable reviews. Unique 105 column screen mode. Supplied in 2 ROMs.

£45

INTER-CHART

This unique program is the only one of its sort on the market. Accepts data from a variety of sources and plots line graphs, bar charts or pie charts. Up to 16 separate charts may be stored in memory. Built in screen dump for EPSON compatible printers, but can use other printer dump routines.

ONLY: £30

These ROMs form part of the first and only truly integrated range of programs for the BBC. Up to 16 sets of data can be stored in memory at once and data can be transferred directly and simply between programs, e.g. from sheet to sheet, or sheet to chart, or word processor to sheet etc., etc.

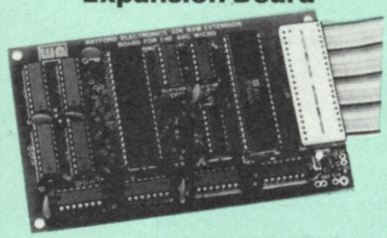
INTER-WORD and INTER-BASE will follow shortly to complete this suite of programs.

P.S. The Watford 32k shadow RAM board is an ideal complement to these programs, allowing them to operate in the 80 column screen modes with NO reduction in memory.

32K

SHADOW RAM- Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in text in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This superb product is recommended by Computer Concepts for use with both Wordwise and Wordwise Plus. We wholeheartedly agree with this commendation.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Only a 12K printer buffer can be used in Wordwise or Wordwise Plus due to the way in which they are written. Print large text files while running long graphics programs and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Only 12K Buffer can be used in Wordwise or Wordwise + because of the way these softwares are written.
- Ensure COMPATIBILITY with a vast range of hardware (including Watford & ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable.
- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages.

Only: £59

(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORD PROCESSING DEAL ! ! !

Watford Electronics, already renowned for quality products at discount prices, are offering, for a limited period only, the truly spectacular BARGAIN OF THE YEAR!

A Watford's 32K RAM Card (offering printer buffering and shadow screen RAM facilities) with the well known WORDWISE PLUS Word processor.

32K Shadow RAM Card/Printer Buffer and Wordwise Plus (a very powerful package) for the absolutely astounding price of:

Only £69

(P.S. For an extra £14, we will include Word-Aid ROM package for the Wordwise Plus, if bought at the same time.)

VIEW

VIEW WORDPROCESSOR 2.1 ..... **£46**

VIEW 3.0 ROM

This latest version features automatic relocation with a 6502 second processor and takes full advantage of any shadow memory fitted. BBC B Plus compatible. Supplied complete with Printer Driver Generator tape.

Price: Only **£60**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£49

VIEWSHEET (Acornsoft) **£49**

VIEWSTORE **£49**

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £10

VIEW DRIVERS FOR JUKI & BROTHER PRINTERS

Only £10

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

Only: £10

ISLAND LOGIC MUSIC SYSTEM £25

Viglen Console Unit

Enhance the appearance and convenience of your BBC Micro with the Viglen console unit.

£42

GLENTOP's 3D GRAPHICS

Development System **£22**

BOOKS (No VAT on Books)

21 Games for the BBC Micro	£5.95
30 Hour BASIC (BBC Micro)	£6.95
35 Education Programs for BBC	£6.95
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Sensing & Control Projects for the BBC Micro	£5.95
Structured Prog. with BBC BASIC	£6.50
Termulator Manual	£4.95
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The Complete Programmer	£5.95
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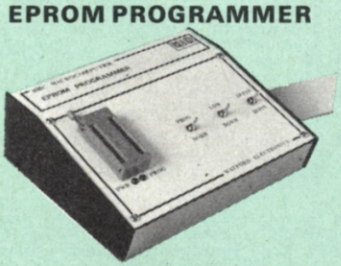
EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE

The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:

Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

SPECIAL OFFER £69
(£3 carr.)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28**
- **ERASER GT** – Deluxe version erases up to 28 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30**
- Spare UV tubes. **£9**

BEEB VIDEO DIGITISER

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Features offered by this package include:

- The adding of pictures or written text to typed documents.
- Unattended recording of scientific data.
- Entry of real images into graphics programs.
- Generation of computer images.
- Slow scan television; sending images via a modem or radio.
- Security.
- Input from any video 1v video source.
- Full resolution in Modes 0,1 or 2.
- 1.6 seconds scan time.
- Up to 8 grey levels
- Manual or Auto level control
- Connects to user port

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£95 (Carr. £3)

(Price includes: Digitiser Unit, ROM & a comprehensive Manual.)

MAGAZINE MAKER

A combination of the AMX Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within AMX Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Magazine Maker £105.00

Continued

DATAGEM

The Definitive Random Access, 24K ROM based Database Management System for the BBC B and BBC B+.

Now compatible with Watford DFS's

Long hailed as the most comprehensive and powerful database for the BBC, and now becoming a legend in its own right, DataGem has been significantly reduced in price now that development costs have been recovered by Gemini. Whether you have a single 40 track drive or a Winchester hard disk, this system will make use of ALL your disk space, treating up to 4 drive surfaces as ONE CONTINUOUS FILE. Much has been made and exploited of DataGem's superb selective searching capability, and together with its unmatched mathematical powers, the system provides a really professional database for use in the home, office or school that will harness the full power and potential of the BBC micro.

AMATEURS & PROFESSIONALS

For newcomers to databases as well as seasoned users, DataGem represents an ideal starting point. Structuring your file and layout couldn't be simpler using DataGem's on-screen 'painting' format. You can have up to 62 fields or data items wherever you want them on a scrolling 120 × 120 card. Colours are all definable, and field data and field titles may be separated if required. Data entered may be stored in up to 8 tiers or 'levels', as well as within the whole database file. Scan one level or the whole database for records that match your search parameters, and place them in another data level for later manipulation. DataGem also boasts limited facilities for producing data merged letters, and may be configured as a 62 cell spreadsheet.

£67

L.B.O.

Life & Business Organiser

– the ULTIMATE BBC utility!

A NEW & EXCITING ROM RELEASE FROM GEMINI

This is a comprehensive life and business organiser package in 100% machine code which has been very carefully designed to provide a wide range of useful facilities for the busy person at home or in the office, and is simplicity itself to use. Once you start using LBO, you'll ALWAYS use it – not like one of those ROMs you only occasionally call on. LBO will put an end to forgetfulness and ensure that your time is organised, you know what you have to do and when, you don't forget bills or birthdays, and you are reminded constantly of urgent matters.

LBO was written by two graduates in Computer Science from Exeter University in consultation with a lecturer in Cognitive Psychology. It has been very cleverly researched and programmed and is confidently recommended by Gemini as a very superior program for the very superior BBC micro.

Features include:

- Automatic reminder of entries overdue for attention.
- One week's advance notice of forthcoming events.
- Urgent notice board.
- Creation of categories of entries; e.g. bills, birthdays, letters to be written, notepad etc.
- Sorting of appointments by date and time of day.
- Month AND week's summary at a glance, indicating time booked and free.
- Single entry of a RANGE of events and updating of regular happenings.
- Super search facility to call any event by any related word or part word.
- Month by month preview of all forthcoming events.
- Built-in intelligent calendar.
- All data saved to disk.
- Full printer support.
- Easy to follow documentation.

Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are ever likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life, LBO is GREAT FUN TO USE!

L.B.O. only £17

Also available on DISK for those with a cluttered ROM board.

DDD Suite

The Revolutionary 'Triple-D' BBC Disk Integrated Software System

-BASE £26

- Up to 2000 records, 1 search level subset, 26 fields/record, 2 drives, 79 chars/field.
- Scrolling screen, 79 × 26. Interrupt driven real-time clock.
- Layout painted on-screen to your design, including background text/graphics.
- Fully menu driven, with powerful line editor and access to *OS commands.
- Default entry capability, no need for tedious re-typing of repetitive data.
- Lightning search using advanced 'hashing' techniques.
- Powerful maths, allowing all BASIC functions, on any field.
- 10 user-defined variables to simplify complex calculations.
- Multiple level 'intelligent' sort – program only sorts 'out-of-order' data.
- Printed reports in record or summary format. Data spool option for transfer to other files.
- FULL DATA COMPATIBILITY WITH 'DDD-CALC' AND 'DDD-PLOT'

-CALC £26

- True disk-based spreadsheet, 2000 rows, 26 columns, 52000 cells. Powerful line editor.
- Fast, smooth machine code screen scroll with pop-down menu.
- Individually adjustable column widths with text overflow.
- Full relative and absolute replication.
- Find and move to a row by name.
- User defined variables, delete/insert rows, SORT rows with 'DDD-Base'.
- Send data from all or part of sheet to printer, or just print cell formulae.
- Data over 1 or 2 drive surfaces.
- Fast recalculation, even over large files.
- All BASIC functions allowed, plus 'SUM', 'MAX', and 'MIN'. *OS calls, and real time clock.
- Data spool option for merging with other files.
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-PLOT'

-PLOT £26

- Stunning menu driven colour graphics using the BBC's capability to the full.
- Pie charts, histograms, scatter graphs, line graphs and function plotting.
- Disk save of screen for instant recall within your own programs.
- Superb data entry editor with up to 255 plottable data entries for text and x/y coordinates.
- Automatic scaling with user override.
- Screen customisation allowable after plotting for background text etc., with up to 64 columns in Mode 1.
- Disk save of ALL data.
- Statistics facilities include mean, max, min, standard deviation, line of best fit, correlation coefficient etc.
- Colours re-definable for any plot.
- Epson m/c fully SHADED screen dump with interface for other dumps on request.
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' and 'DDD-CALC'

Combo Pack – All 3 modules £60

Money Management

This program is designed for disk users. It allows individual transactions to be stored and retrieved in respect of up to 5 separate Bank/Building Society/Investment accounts AND up to 5 Credit card/loan/Mortage accounts.

The transactions are also analysed – and may be (screen) listed – under 3 separate Income and 15 separate Expenditure headings.

Each transaction consists of:

(1) Date
(2) Description – up to 16 characters.
(3) Amount
(4) Last 4 digits of cheque no. or a credit card transaction reference. (Payments only)

Account and income/expenditure headings may be personalised.

Budget amounts can be stored for each of the 15 expenditure heads and a report shows how expenditure to date compares with the budget. It also shows the balance remaining. This report is also produced in percentage terms and a third report forecasts annual expenditure based on expenditure to date at any particular time.

A further report gives balances for each Bank/Loan account at the beginning of the year, balances for each income/expenditure account to date and the resultant Bank/loan account balances. This report represents, therefore, the changes in liquid assets and liabilities over the period, both in terms of totals and of distribution between accounts.

The main menu contains a print option for this report.

Lists of outstanding cheques or credit transactions may be produced for each account and when statements are received, input of the cheque reference no. (last 4 digits) and the amount causes verification to occur (on screen), whereafter these cheques are removed from the cheque no. file, the remaining list of unpresented cheques allowing simple reconciliation of each Bank a/c Similar reconciliation of credit card a/cs can be achieved.

The program caters for transfers between accounts (e.g. from Bank to Building Society a/c or from Bank to Credit card a/c etc) the relevant details being input only once.

The program also allows for standing orders to be set up on any single account or between any two accounts. These are paid simply by inputting a date up to which the payment of all orders should be recorded. The necessary debits and credits are then created and the date of each order is reset. Orders can be for any multiple of calendar months.

The program is fully menu driven and all areas of input are 'range protected'. As much guidance as possible is included in all screen displays and the user is always given the opportunity to abort a transaction.

Full amendment and deletion routines are provided; for individual transactions, for Standing orders and for budgets.

The main file can hold between 800 (all full length descriptions) and 1800 (no descriptions) transactions. The former should be sufficient for most people for at least one year and the index file size is set on this basis. A warning is flashed on the main menu when the main file reaches 750 transactions. Account balances may be carried forward to a new set of accounts.

All you will ever need in a home finance package and beautifully presented.

£11

VALUE!

With over four years experience of providing practical software solutions for business and home applications, Gemini have put together a selected range of famous titles for the BBC and BBC Plus in TWO special packs, at VERY SPECIAL prices. These super value packs contain all the serious application software you're ever likely to need for your BBC, from spreadsheet and database management to a complete professional business accounting system. Gemini's 'OFFICE MATE' and 'OFFICE MASTER' packs are here – put that computer to WORK!

- Database
- Beebcalc Spreadsheet
- Beebplot Graphics
- Word Processor
- Full Documentation

Cassette or Disk £10

- Cashbook
- Final Accounts
- Mailist
- Easiledger
- Invoices & Statements
- Stock Control
- Full Documentation

Cassette or Disk £20

Watford are pleased to announce that they are now stocking almost the entire range of Gemini's BBC software. Fuller descriptions of items may be found in Gemini's own advertising within this publication.

VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£16
Delta 14B Single Joystick	£12
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc/Tape	£7

ROM EXTRACTION TOOL

This extremely useful tool allows you trouble free chip removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip.

Price: **£2**

Acorn's GRAPHICS ROM £25

SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. A must for every computer user.

Protection for only **£9.50**

Replacement FLEXIBLE KEYBOARD CONNECTOR

A 'Keyboard to Micro' replacement jumper lead.

£4

ATTACHE CARRYING CASE for BBC Micro

The Attache carrying case is attractively finished in mottled antique brown leatherette. The case is made of tough plywood, providing a very solid and safe way to carry your BBC micro. There is room provided to fit all the leads necessary behind the computer and manuals in the front. Locks supplied with two keys. Price **£13** (£2 carr.)

DATA RECORDER

Top quality slimline portable cassette recorder designed specifically for use with home computers. Mains/Battery operated with tape counter.

£20

DATA CABLE to connect recorder to BBC **£2.00**

DATA CASSETTES

Top grade tested C12 Data cassettes supplied in library cases **35p** each; 10 for **£3.20.**

CONNECTING LEADS

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug	
to 5 pin DIN Plug + 1 Jack Plug	**£2.00**
to 3 pin DIN Plug + 1 Jack Plug	**£2.00**
to 7 pin DIN Plug	**£2.50**
to 3 Jack Plugs	**£2.00**
6 pin DIN to 6 pin DIN Plug (RGB)	**£2.50**

DISC DRIVE POWER LEADS
Supply from BBC power supply to standard Disc Drive connector.
Single **£3.00** Dual **£3.75**

DISC DRIVE INTERFACE LEADS
BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

MISCELLANEOUS CONNECTORS

	Plugs	Sockets
RGB (6 PIN DIN)	30p	45p
RS423 (5 pin Domino)	40p	50p
Cassette (7 pin DIN)	25p	65p
ECONET (5 pin DIN)	20p	30p
Paddles (15 pin 'D')	110p	215p
BBC Power Plug 6 way	80p	–
Disc Drive Plug 4 way	75p	–

ACORN MUSIC 500

The Acorn Music 500 System is probably the most powerful piece of music generating hardware available for the BBC Micro.

***£72** (carr £4)*

النور ARABIC ROM for the BBC Micro

The ALNOOR ARABIC ROM converts your BBC into a bilingual computer. New keytops provide both English and Arabic symbols. Two sets of Arabic symbols are provided for use in either context sensitive or insensitive operation.

20, 40 and 80 column operation. Compatible with ASMO (449). English/Arabic printer interface software. Numeric entry from either left or right of number. Communications software to send or receive 7 or 8 bit data.

Different shapes of Vowels (e.g. Shadda, Fatha, etc). Different shapes of Hamza. Full English and Arabic character sets with all special characters.

£85

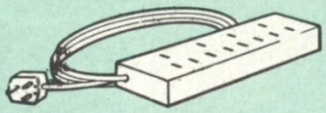
(Price includes Alnoor ROM, Operating Manuals & a full set of Arabic/English Keytops)

PLINTHS FOR BBC MICRO AND PRINTERS

Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£20** (carr. £2.00)
PRINTER PLINTH	**£10** (carr. £1.50)

4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. Allows the whole system to be switched on from one plug.

£9.99

CREDIT CARDS 24 HOUR HOT LINES
ACCESS 0923 50234
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SPARES for BBC Micro

Keyboard	**£46;**	Keystrip	**£2**
Power Supply	**£45;**	Case	**£25**
UHF Modulator	**£4;**	Speaker	**£2**
Speaker Grill	**£1;**	Keyswitch	**£2**

28 pin ZIF SOCKET (Textool) **£6.95**

28pin DIL HEADER PLUG

SOLDER type	**£1.50**
IDC CRIMP type	**£1.95**

RIBBON CABLE

28way **55p/ft;** 34way **60p/ft.**

8way DIP SWITCH **£0.85**

CHIP SHOP

7438	40p	UPD7002	£4.40
74LS04	25p	SN76489	£5.50
74LS123	80p	27128-250nS	£3.00
74LS244	80p	6264LP-8K	£4.00
74LS393	£1.20		
74LS00	25p	**ASSORTED ROMS**	
74LS10	25p	ACORN DNFS	£15
74LS163	70p	ACORN BASIC 2	£16
74LS245	£1	Serial ULA	£13
4013	60p	Acorn BCPL	£46
4020	£0.90	Acorn FORTH	£36
DS3691	£3.50	ICON Master	£29
LM324	£0.45	ROMIT	£29
6502A CPU	£5	TERMULATOR	£28
6522	£3.40	Video ULA	£15
SAA5050	£8.75	Acorn COMAL	£39
2764-250nS	£2.00	Acorn LOGO	£60
6116LP-2K	£2.75	ISO Pascal	£60
8271	£45	MUROM	£17
ACORN OS 1.2	£6	SLEUTH ROM	£24
4816	£1.00	Toolkit Plus	£33
DS88LS120	£3.00		

ACORN'S GRAPHICS EXTENSION ROM
GXR-B £21.00 GXR-B+ £22.00

Prices subject to change without notice and available on request.
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GOVERNMENT AND EDUCATIONAL ESTABLISHMENTS OFFICIAL ORDERS ACCEPTED.
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CLARES Nº1 IN UTILITY SOFTWARE!

BROM £34.50 £27.50

THE NUMBER ONE TOOLKIT ROM FROM CLARES

*EDIT is a FULL SCREEN EDITOR, which means that you can scroll your program up and down just like WORDWISE does with text, do not confuse this powerful editor with the line editor used in other toolkit ROMs. The EDITOR allows insertion and deletion of lines and insert and overwrite within a line. This is the editor that the BBC micro should have had.

*ERROR ON will trap errors in a program and enter the EDITOR at the statement generating the error, no more wading through multi statement lines trying to identify the error.

Commands pioneered by BROM are:
*ROMON & ROMOFF which enable you to turn on/off sideways ROMs so that they stay off even after CTRL/BREAK. This also allows the DFS to be swtiched off and PAGE reverts to &E00 automatically.
*CASE which forces input into upper or lower case irrespective of caps/shift lock.
*FLIST which lists a program one statement to a line but more importantly it will even list 'BAD PROGRAMS'.
*ONEKEY is a single key entry option but you can also define your own strings to any ASCII key, just like an extra 48 function keys.
*FIND, *CHANGE & *SCHANGE provide selective or global SEARCH and REPLACE facilities. These commands work with strings and keywords or a mixture of both e.g. *FIND PROChelp T', will list the full line containing PROChelp, the 'T' simply tokenizes any keywords.

Yet another group of commands allow lines to be moved or copied to a new location.
The other commands provide function key editor, 'BAD PROGRAM' cure, variable lister, integer variable flush, program compacter etc.
This is a genuine useful ROM that no user should be without. Be warned, once used you will not be able to live without it!
"This is the best BASIC screen editor I have so far used." MICRO USER August 85.
"...this is the best On-Screen BASIC Editor I have ever used; it is far superior to BEEBUGSOFTS TOOLKIT." Viewfax Tubelink

FONTWISE PLUS £20.00

Now compatible with WORDWISE, WORDWISE+ and VIEW plus additional format commands and extra fonts. Now you can have PROPORTIONAL and JUSTIFIED text by using FONTWISE to print text prepared on the above word processors. Not only that but you can have it in 12 different fonts, all within the same document if required.

* PROPORTIONAL & JUSTIFIED TEXT
* NOW WITH ADDITIONAL COMMANDS & FONTS
* 12 FONTS - inc. italic, serif, broadway, script etc. with more to follow
* CONDENSED, NORMAL or DRAFT
* PAGINATION
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How to maik your micro spel welle...

MIKE MAHON compares two spelling checkers for the BBC Micro

ONE of the major uses of the BBC Micro, and for that matter many other micros, is in the production of text files either for printouts or, more recently, for electronic mail.

Although current word processors for the BBC Micro enable the easy production and correction of text, they do not take account of the innate poor spelling ability of many writers, nor of the ubiquitous typographical errors introduced from accidental presses of the wrong key when typing at speed.

I also still find it more difficult to spot such errors on the screen than on a draft printout, and therefore get through more paper than I should.

Some of the expensive CP/M word processors have built-in spellchecking facilities. However the majority of BBC Micro users would find a good cheap non-word processor specific spelling checker program just as useful.

The major features I am looking for in such a utility are ease of use, compatibility with different text formats, a large inbuilt dictionary with English spelling, user definable dictionaries, an incorrect case identifier, speedy text checking, portability and finally hardware compatibility (memory upgrade).

It would also be an advantage if parts of the main dictionary and user definable dictionaries could be edited, merged or deleted and could include characters other than the letters A to Z.

Remember, however, the current spelling checkers can only inform you if a word is not recognised in their dictionaries – they cannot correct the spelling automatically, nor spot correctly spelt words used in the wrong context, such as singular and plurals.

Perhaps a useful addition to such a utility would be a context/grammar checker to take account of the incorrect use of "was" and "were", "to" and "too" and so on, but that is probably asking just a little too much of the old 2MHz 8 bit machine, and anyway it would leave our editor with nothing to do.

A few disc-based spelling checkers for the BBC Micro have been available for some time, like Beebugsoft's original Spellcheck (see my review in the November 1984 issue of *The Micro User*) and Dataware's Spellwise.

Currently three ROM-based checkers are generally available for the BBC Micro – Watford Electronics' Romspell, Beebugsoft's Spellcheck III and Merlin's Scribecheck.

Now let's see what two of these state of the art BBC Micro spelling checkers have to offer in the main role of looking for and correcting spelling mistakes.

Both were put through their paces on a BBC B fitted with an Acorn DNFS 1.2.

Romspell v.1.00
Watford Electronics

THIS is an extremely versatile spelling checker first released in the spring of 1985. It is capable of checking almost any spooled Ascii file and straight View, Wordwise or Mini Office files.

The package includes a 16k eprom, 80 track or 40 track single sided dictionary disc and a 24 page spiral bound A5 format manual.

The latter was very clear and covered all aspects of the utility very well, though a command and option summary page would have been helpful.

The Romspell dictionary disc contains a specially compacted 80k file !SYSTEM which holds the main system dictionary of 30,000 words – only a little short of the number of main headwords contained in the Concise Oxford Dictionary.

It also holds a user-definable dictionary !USER capable of taking about 600 words, and an example text (a Biblical passage) thus leaving about 115k free on an 80 track single density disc.

The disc may, and should, be readily backed up for security, thus providing a workdisc for everyday use.

The chip was not fussy as to which socket it occupied, did not alter PAGE, nor did it clash with any of the numerous other ROMs tested alongside.

Romspell acts as a language and is called by keying *RS which produces a menu screen with 10 options (see Figure I).

Star commands may be entered from the menu. It can also be entered direct from View, Wordwise or Mini Office using *RS, whereupon the text is automatically saved for security, Romspell entered, and the file reloaded ready to check. That's what I call ease of use!

Once a file has been loaded option 2 or 4 is usually selected. The interactive check is best used for shorter files, as the scanned text is stopped on each occurrence of an unrecognised word, which can then be edited, skipped, added to the user dictionary, or escaped in order to select option 6 – the ambiguous word check.

Embedded control characters from the word processors are ignored in the checking routine.

In the two pass file check the whole text is scanned, all the unrecognised words marked and the file saved. On the second pass the marked words are then more quickly found ready for editing and so on.

Romspell is extremely fast. It took two minutes and three seconds to check my own example Wordwise file – the first 1000 words of my Basic Editor article from the November *Micro User*. You just try looking up eight words a

→

Romspell Menu Options	
1	Save text file
2	Load text file
3	Interactive file check
4	Two pass file check
5	Resume file check
6	Ambiguous word check
7	Display dictionary
8	Add to dictionary
9	Delete from dictionary
0	Exit to previous task
Escape returns to this menu	

Figure I

From Page 49

second in a dictionary.

What was most amazing was its large system dictionary evidenced by the fact that it moved through great chunks of text without pausing. Indeed only six words were not recognised.

Editing of a misspelt word is easy using the cursor and Delete keys. Saving a new (correctly spelt!) word to the user dictionary simply involves pressing the Copy key. Alternatively a word not wanted in the user dictionary, such as a personal name or abbreviation, may be skipped using the cursor right key.

All this editing is quite straightforward and doesn't involve numerous annoying bleeps.

Once the user dictionary is built up with your own personal, jargon and technical words it is surprising how much quicker the whole process becomes.

Also the user dictionary may be displayed in whole or part, added to or deleted from using menu options 7, 8 and 9.

Unfortunately for the curious, because of the data compaction techniques employed, the system dictionary cannot be viewed.

Menu option 0 once more stresses the ease of use of Romspell, in that following a spelling check the word processor can be re-entered if that was the previous task.

The last, but not least, of the menu options I tried was the ambiguous word check. This is a unique and amazing feature of Romspell in that upon locating a misspelt word you may escape to the menu, select option 6 and type the word with a question mark at the dubious part, for example "microcomput?r".

Romspell then hunts through its dictionary and displays all valid options from which you can select the correct one and amend the text.

This utility is quite fast, ranging from less than one second to about 15 seconds depending upon the length of the word in question. This option could be very useful in a teaching situation.

Another unique feature of Romspell is the check-as-you-type option. Following the command *RSON anything typed at the keyboard directly, or from a word processor, is checked on a word for word basis and a bleep is sounded if the word is not recognised.

This slows down word processing a little, but would be a boon for schoolchildren learning to spell.

It is also useful as a part syntax checker for Basic keywords while programming. The option is ended with *RSOFF. Furthermore a single string may be checked at any time with *RS *string*.

For the latter facilities, as with menu options 3 to 6 of course, the dictionary disc must be present in the disc drive.

The program has a number of limitations.

A minor one is that Romspell can only check against the system and a single user dictionary at once. It would be more useful if alternative user dictionaries could be merged or easily selected at the menu, especially when the writer uses a lot of specialist words.

Secondly, I was rather disappointed that it could not distinguish the incorrect use of case as between "the" and "tHe", a rather common typographical error for poor typists like myself. This facility was available on Dataware's disc-based checker released almost two years ago.

It would be useful to include case specific technical words such as STARdataBASE or ATPase in the user dictionary.

Thirdly, it would also be useful if non-alphabetic characters such as apostrophes, hyphens, brackets and numerics could be included within words, again with the technically oriented text in mind. For example, chemical terms such as 8-hydroxy-1,4-naphthoquinone in a user-defined dictionary would be an enormous help to some writers.

Fourthly, the reviewed version was not second processor compatible (it asks for it to be switched off) which is a pity when entering the checker directly from the word processor. It does, however, work on a BBC Micro fitted with the Watford shadow screen RAM board and on the BBC Plus.

Last, and most unfortunately, there is one major bug in Romspell. The whole program crashes with loss of data if a word longer than 16 characters is met, making it virtually useless for most professional and technical work like my own requiring such nasties as phosphofructokinase and facioscapulohumeral.

This limitation was first pointed out to me by fellow reviewer Rory McCloy, who regularly crashes his system with the inadvertent use of choledochoduodenostomy or gastroenteroanastomosis, but I suppose that serves him right for being so clever!

CONCLUSIONS: The major plus features of Romspell are its compatibility with View, Wordwise and Mini Office files, as well as pure Ascii text, its enormous dictionary, speed, ease of use, ambiguous word check, and its direct checking ability. Romspell is therefore excellent value for under £30 as a spelling checker for most domestic BBC Micro users.

However if some of the limitations listed above, particularly the word length limit, inclusion of non-alphabetic characters, wrong case check, and second processor compatibility were removed then I would have no hesitation in recommending it as the first choice for all writers using the BBC Micro. A great innovative product – I cannot wait for the mark 2 version.

Spellcheck III v.3.00
Beebugsoft

THE major advancement in this latest implementation of Spellcheck, released at the November 1985 Electron & BBC Micro User Show, is its vastly increased speed.

The checker comes on a 16k eprom supplied in one of Beebugsoft's splendid new silver livery video boxes. This includes a 40 or 80 track dictionary disc containing a 5982 word dictionary in the file WORDS. The accompanying booklet is the 12 page A5 format Spellcheck II manual.

Spellcheck III also contains a 2000

word store on the ROM itself which explains much of its increased speed. It is also compatible with either of the three major BBC Micro word processors, View, Mini Office and Wordwise (including the Plus variety).

Like Romspell, it is a language ROM and is invoked with the command *SPELL which prompts you to select either the View or Wordwise option. (The Wordwise option is also suitable for Mini Office files.)

The main menu then appears giving

Spellcheck III main menu

A	Automatic check
B	Attended check
D	Select drive
U	Dictionary utilities
L	Load text
S	Save text

Figure II

the options shown in Figure II, as well as the use of star commands. This selection is similar to the Romspell choices except for the ambiguous wordcheck facility.

Selecting U for dictionary utilities offers a second menu, see Figure III, which allows for the initialisation of a new dictionary disc, erasure of words, or searching for words in the dictionary.

This option was extremely fast, one or two seconds, no matter how long the word seemed to be or what letter it started with. Interestingly, the "word" BBC was not present though APPLE, PET and APRICOT were.

Like Romspell, there was the facility to add words to the dictionary directly from the dictionary utility menu during the Search option.

Spellcheck III was fairly user friendly. Normally the checker is initialised, a word processed file loaded and the attended or automatic check selected.

In the attended check unrecognised words are marked with a yellow ? and can be filed in the main dictionary (F), stored temporarily (T), bypassed (B) or have their spelling changed (C). These four options are displayed at the bottom of the screen as a reminder.

If the automatic check is used the complete text is checked in the first pass and each unrecognised word immediately jumped to for editing in the second pass.

Spellcheck III is the fastest checker I have seen for the BBC Micro. My 1000 word test file was dealt with in a mere one minute 25 seconds on the standard micro and in 65 seconds with the 6502 second processor switched on.

This latter is more than twice as fast as Watford's Romspell (15 words a second) though only around half that claimed in the advertisements.

The disappointment was that 79 words were unrecognised due to the much-reduced dictionary as compared with Romspell, thus the time gained was spent adding new words to the dictionary disc.

A 40 track dictionary disc, however, may eventually contain up to about

Spellcheck III option U menu

D	Select drive
E	Erase word
I	Initialise dictionary
S	Search
Esc	Main menu

Figure III

17,000 words although I have no idea how this might affect performance.

Unlike Romspell the added words cannot be directly viewed at a later date so misspelt words may be entered. They may, of course, be searched for and erased.

As with Romspell, the Spellcheck dictionary can be backed up readily, though separate user-created dictionaries cannot be merged.

Editing a word to change its spelling involved the cursor keys, and was only slightly more fiddly than on Romspell. Spellcheck III was able to take account of apostrophes and hyphens (but not numerics) within words and did not even shudder with words as long as 40 characters. It still, however, omitted to notice "tHe" and similar errors as a mistake.

Spellcheck III can take advantage of the 6502 second processor and works on the BBC Plus. It is also compatible with dictionaries created by Spellcheck II and may be upgraded, at cost, from its predecessors.

CONCLUSIONS: Spellcheck III is slightly more expensive than Romspell at around £35 but still provides good value for money. Its advantages over Romspell include speed, second processor compatibility and it deals with non-alphabetic characters and long words.

It does not, however, have the superb inbuilt dictionary or extra versatility – Ascii text check, ambiguous wordcheck, and spell as you go features – of Romspell.

So which one would I buy? At the moment it would have to be Spellcheck III, but only while I am waiting for Watford to, hopefully, bring out a new "professional" version of the excellent Romspell, which can handle long words – thatsallfornowfolksbyeeee!

Mike Mahon

PROBLEM

I WISH to build a teletext adapter for use on my BBC Micro. Can you advise me of any available circuit designs? – M.W. Hudson, Wetherby, West Yorks.

SOLVED

I know of no circuits for a teletext adapter for the BBC Micro. However, if you want to write your own software you can take a standard teletext circuit and place data select ICs in the address lines of memory. Then you can switch between computer access and teletext access of the memory. You will also need to parallel up the memories data output lines with some inputs to your computer. Suitable circuits for modification are in Mullard Technical Information No. 72 – try libraries.

Mike Cook

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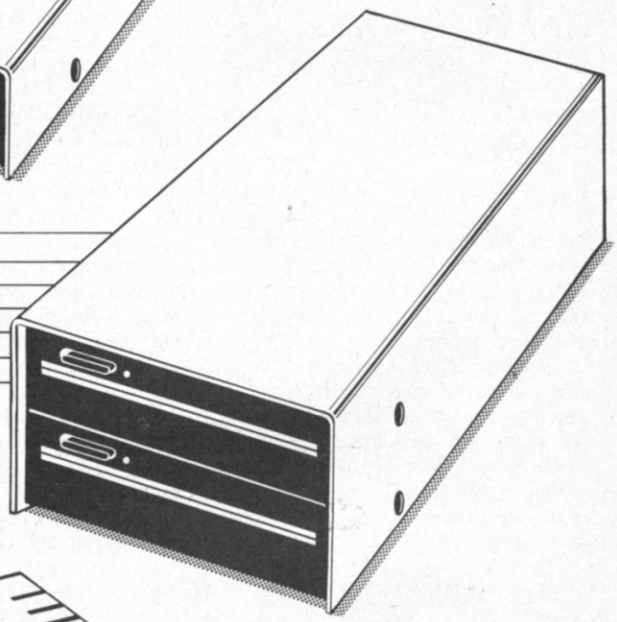

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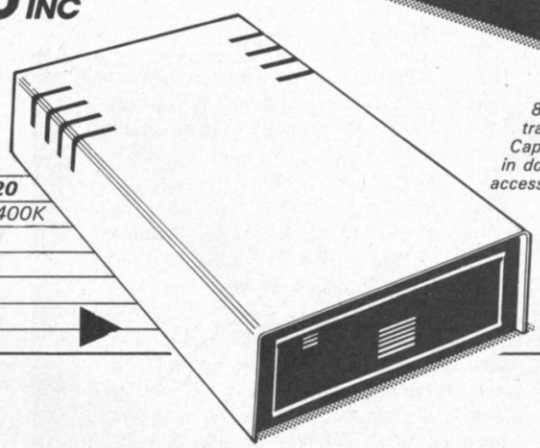

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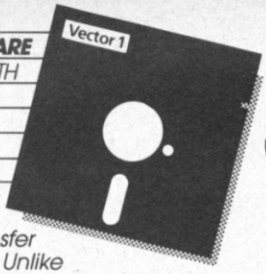

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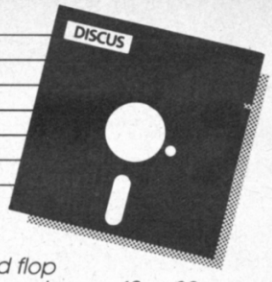

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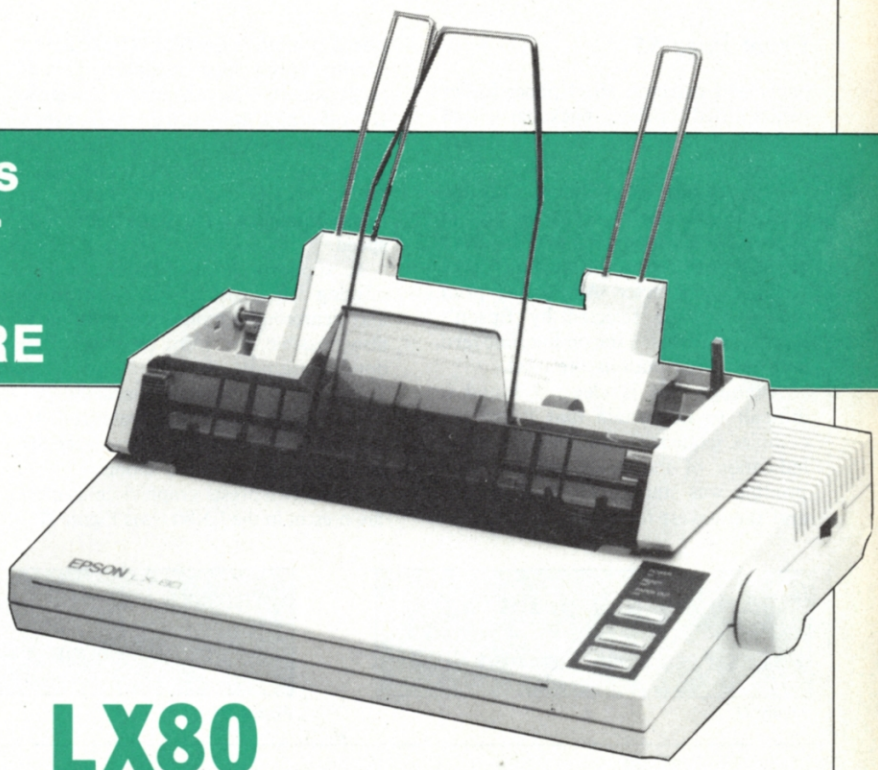


LX80 – the neat machine

THE LX80 is Epson's newest low cost dot matrix printer which, in addition to the usual facilities, has near letter quality printing.

It is smaller, neater and lighter than its worthy predecessors. The all important dip switches are accessible from the outside of the case and will set start up options for international character set, paper out indication, form length, NLQ or draft mode, character width, beeper on/off, carriage return with or without linefeed, printer active/deactive and open or slashed zero.

In its basic form the LX80 only possesses friction feed, but a neat tractor unit that sits on top of the printer and takes only a few seconds to fit is available as an extra at low cost. This tractor unit accepts paper from four to ten inches in width and has one particularly nice feature – the friction feed must be set to "free" in order to install the tractor unit, so that you cannot get paper torn because both drives are active.

However there is no protection at the rear of the tractor unit, so that paper already printed can get caught up in the rear of the mechanism. Loading paper is easy, with or without the tractor feed.

Epson also offers a very low priced single sheet feeder which I have not had the opportunity to try. Paper tear off facilities do not exist, so that the continuous roll user will have to get used to using scissors.

Epson have departed from the long ribbon cartridge that was characteristic of MX, RX and FX printers, the LX80 having a four inch square cartridge which clips on to, and moves with, the print head.

Although it doesn't last as long as the traditional type, the replacement cost at the moment – only Epson make the cartridges – is the same. When second sources become available no doubt the price will fall.

One great advantage of the new system is the ribbon guide, which prevents the ribbon touching the paper during paper loading or paper feed. No more messy black smudges.

All the usual print facilities are supported, such as enlarged, emphasised, condensed, double-strike, underlined, italic, unidirectional, superscript and subscript, the majority being available in pica and elite sizes (see Figure I).

Although proportional spacing and reverse paper feed are not present (only on the FX80), five line spacings, both margin settings, vertical and horizontal tabulation, perforation skip, and form length setting are all supported. Buzzer,

This is draft mode

This is emphasised

This is enlarged

This is condensed

This is double strike mode

This is underlined italic

this is superscript and subscript

This is elite size

Figure I

From Page 55

paper end detector, sheet paper feeder (when fitted), delete, backspace, half speed and reinitialise are all software accessible.

One feature in common with the FX80 is the master select facility, in which several commands may be given at one time by setting different bits in the command character. Also many print modes may be selected by Epson's SelecType in which the on-line, line feed and form feed buttons are used.

Although this is clever I found it difficult to be certain that I had the complex sequences right, there being no indication of the mode selected until printing was started. The best feature, and the newest for Epson in a budget priced printer, is the NLQ (Near Letter Quality) print face available. This is really superb – as you can see in Figure II – offering a more usual typeface than the Stars reviewed in the December 1985 issue but with slightly more ragged edges. NLQ is much slower at approximately a sixth of the draft mode speed.

It supports a justification facility, offering left, right or full justification and centering. Emphasised printing is also possible, but most other typeface options are not.

Eleven international character sets are supported, being selected by dipswitch or software. These sets are also supported in NLQ mode.

Thirty two preset graphics characters are present in the LX80 – see Figure III – and they may be modified to change pitch and weight by combination with enlarged, emphasised, pica and so on. In most cases the characters are contiguous horizontally, but line spacing needs to be altered in order to join successive lines of characters.

In common with the FX80, programmable characters are supported but only six in number. However these can be designed in both draft and NLQ modes.

All the graphics modes present in RX80 and FX80 printers are supported by the LX80. All the various dumps I have tried work well, including Mini Office.

The buffer in the LX80 is only small, taking only about half of one A4 page and disappearing when characters are redesigned. When compared with the

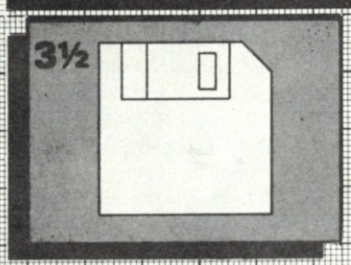
```
This is NLQ printing

This is emphasised NLQ
```

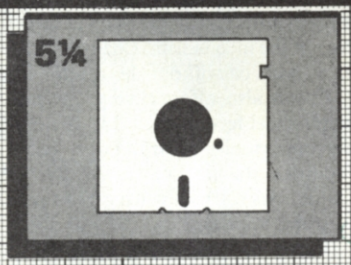
Figure II

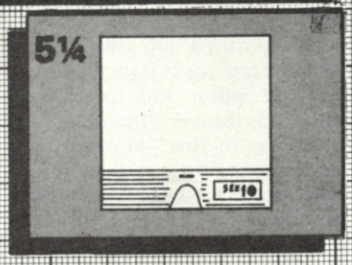
```
These are the graphic codes available:-
```

Figure III

TOP QUALITY DISCS AT COMPETITIVE PRICES FROM 79p







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RX80 and FX80 on a speed test the LX80 took only 58 seconds in draft mode against the RX80's 75 and the FX80's 53 seconds.

When compared with the Star printers using Mike Mahon's test, the LX took 45 seconds, indicating a comparative speed of 100-120cps against the FX80 and Star SG at 100-120cps and the Star SD at 150-160cps.

The manual is a great improvement on its predecessors, being written in English! Many examples of the various facilities are given after careful explanation of their function.

A number of appendices contain a detailed breakdown of the codes, in Ascii, decimal (for Wordwise), hexadecimal and control formats. The Ascii codes and character fonts are listed and the software commands are shown in numerical and function order.

The dip switches, technical specifications, parallel interface protocols and tractor unit are all detailed, and an especially helpful section on trouble-shooting and matching different computer systems is also present.

The pull out reference card with all commands and the Ascii character sets is let down by the absence of decimal codes, which would have been of value to the Wordwise user.

All in all Epson have produced a great new little printer, but I wish they had designed a tractor mechanism into which the paper could not re-enter. A tear off facility would also help. Still – highly recommended.

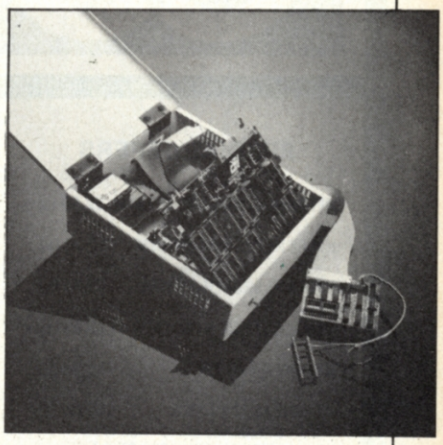
PROBLEM

COULD you tell me why Music System by Island Logic will not work on my BBC with a UDM DDFS disc interface 1.1? It will load and run the first title page but then the computer freezes – D. Cunningham, Barnsley.

SOLVED

The protection method used on the Island Logic system is complex but basically it talks to the 8271 disc control chip directly. As you do not have this chip in your computer the program will not run.

ROM/RAM BOX OF MANY PARTS



THERE have been a wealth of add-on expansions to accommodate sideways ROMs and sideways RAM for the BBC Micro, so I was not particularly excited when I was asked to look at the HCR external ROM/RAM box.

However as soon as I had unpacked the unit I was impressed by its sturdy manufacture. There are two units: the external ROM box itself, and a small printed circuit board possessing 28way pins underneath and a 28way socket and several chips above.

This board also has a 40way socket and three small sockets attached by flyleads. The pins are all small diameter and will not damage the sockets in the BBC Micro.

Fitting is easy, requiring no soldering. The internal board is fitted into the right hand ROM socket of the BBC Micro with the displaced ROM carried in the socket on top of the new board.

The 6502A CPU chip is removed and the 40 pin socket inserted with the 6502A remounted piggyback. Finally the two twin sockets are attached to the links at S21.

The ribbon cable is then routed backwards out through the ventilation slot at the rear of the micro, being long enough to allow the external ROM box to be placed on either side. The other connection required is a mains supply to the box.

The main unit is of steel with a hinged lid and contains the power supply and one or two expansion cards. Each card will support 12 16k ROMs or their equivalent.

The wealth of options supported includes the substitution of four 8k ROMs for two of the 16k positions, and the insertion of up to 16k of CMOS RAM. This RAM can be in 6264 or 6116 format, although the latter uses eight sockets so that only four additional ROMs are available on the same card. Each card has 13 links which must be set. The fitting instructions explain which links must be set for the various options, the text concerned occupying a side of A4 typing.

One disappointment encountered was the lack of space for mounting zero insertion force sockets on the cards. A write protect switch is mounted on the front of the box.

In use the HCR box is delightful, being almost completely transparent to the micro. Switching between upper and lower cards is achieved by poking &D000 or &C000 with 0 followed by Break.

Unfortunately the ROMLink series of ROMs from Computer Concepts appear to poke these locations when importing data from one chip to another, thereby providing a hang-up.

One experiment I was determined to try was to switch on the micro without the ROMbox mains supply on.

Contrary to expectations this does not result in a hang-up, the micro only recognising the ROMs physically sited within its own case, including the one piggybacked on the internal part of the expansion system.

Although priced at over £100 in the two-board configuration, I think the HCR external ROMbox is the most versatile I have yet seen, supporting the equivalent of 28 16k ROMs although 24 are in two banks of 12.

Ian Whitmore

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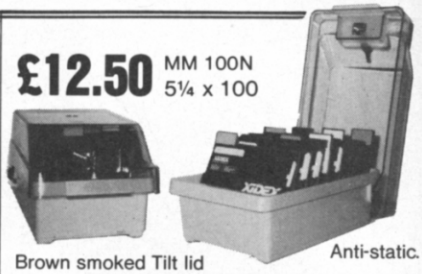

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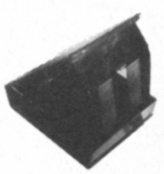

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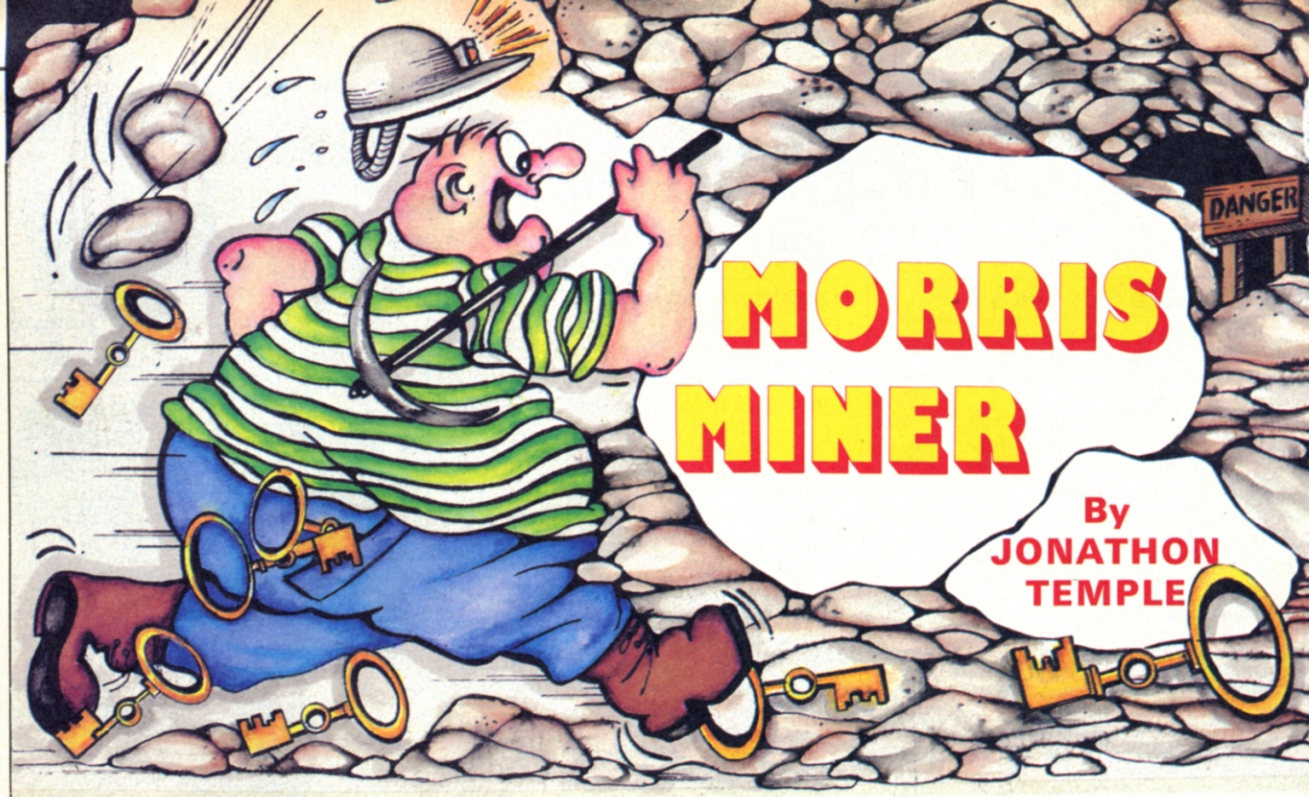


MORRIS MINER

By JONATHON TEMPLE

TRAPPED inside the deserted uranium mine workings, Morris the Miner must try to collect the 14 keys which will allow him to escape to the outside world.

You can control him using the A, Z, < and > keys, and he can be moved between the seven interlocking screens which make up the mines. However, you must be careful not to let him fall too far – if he does he will die.

On his travels Morris can use the ladders and lifts, but he must avoid the debris which falls from the unstable roof of the mine workings.

The roof is gradually caving in and Morris must escape through the exit before the time limit, shown in bar form at the top of the screen, runs out.

Points are awarded for collecting a key and escaping from the mines successfully – the latter depends on the amount of time left, the skill level and the number of lives remaining.

Morris can also increase his score by collecting the flashing letters which form the word BONUS – collect them all and a large bonus is given. Points are awarded throughout the game in proportion to the skill level.

There are several skill levels ranging from 1 (difficult) to 5 (easy), which affect the amount of falling debris and the time limit. The skill level can be changed by pressing a key from 1 to 5 while the hi-score is being displayed.

Although written entirely in Basic, the game is fairly fast and requires a lot of careful forethought to complete within the time limit. The integer variables *A%-Z%* are used extensively to speed the program up and save memory.

The program also makes use of the indirection operators ? and ! to access the data for the interlocking screens and the key and bonus letter positions, which are held in a byte array and two two-byte arrays respectively.

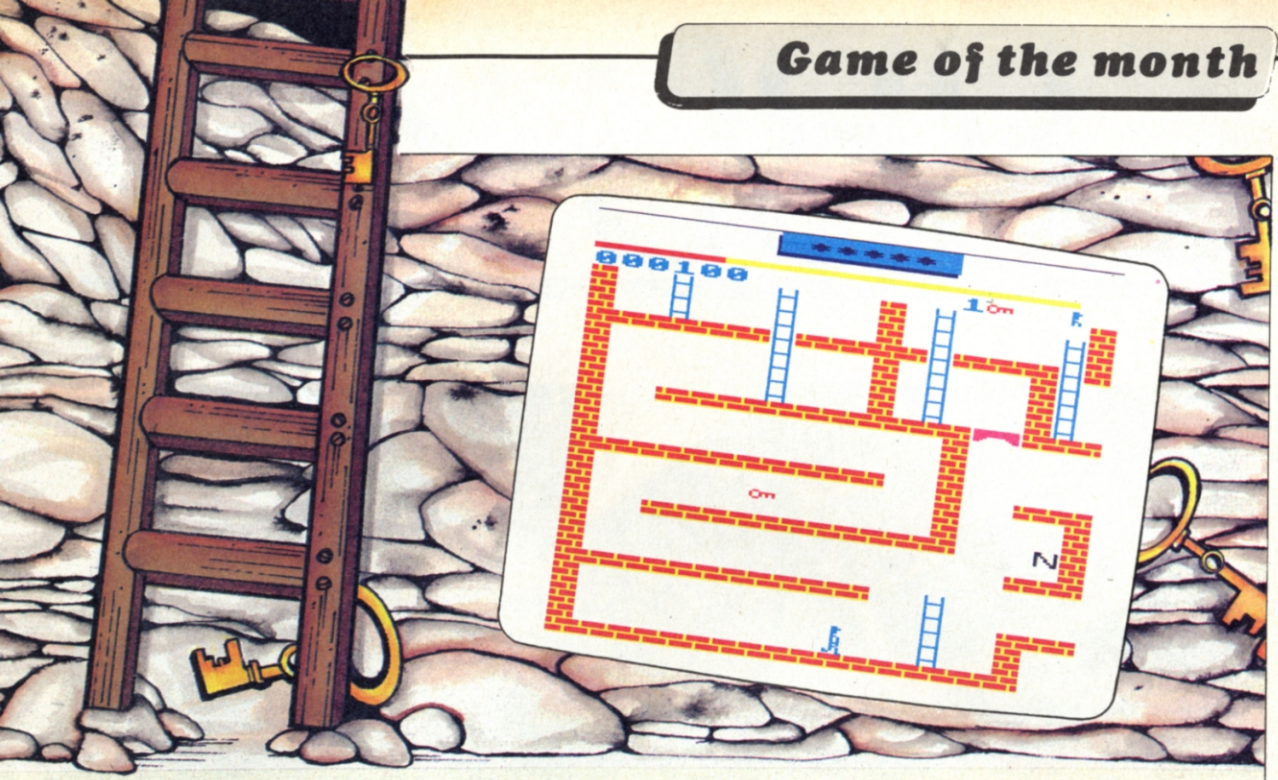
Data for the seven screens – lines 2330 to 2730 – is contained in the format *number of walls, number of ladders, lift's X and Y positions, lift's X and Y directions*, followed by blocks of three hex numbers which contain the positions of the individual walls and ladders.

The first hex digit is the X position, the second the Y position and the third the length. The top bit of the length digit is set if the wall is to be vertical rather than horizontal.

So 00009A would be a vertical wall 10 (&A) bricks long at TAB position

VARIABLES

A%,B%	Old X and Y position of man.
C%,D%	Old characters for man.
E%	End of game flag.
F%	Man falling counter.
G%	Current skill level.
H%	Current high score.
J%	Direction man walked off screen.
K%	Number of keys collected.
L%,M%,N%	General variables.
P%	Current screen.
Q%,R%	X and Y position of lift.
S%	Current score.
T%,U%	X and Y position of debris.
V%,W%	Characters for man used in animation.
X%,Y%	X and Y position of man.
Z%	Current number of lives.
SCR%	Position in memory of interlocking screen data.
KS%	Position in memory of key data.
BS%	Position in memory of bonus letter data.
N1%	Number of walls.
N2%	Number of ladders.
LS%	Last score.
L1%,L3%	X and Y data position of lift.
L2%,L4%	Two horizontal/vertical limits for lift.
IX%,IY%	X and Y directions for lift.
T	Time left on time bar.
A$,C$,D$	General string variables.
B$	Current state of BONUS letters.
H$	Name of high scorer.



(0,0), while 04030C would be a horizontal wall 12 (&0C) bricks long at (4,3).

Anyone wishing to design their own screens will also have to change the bonus letter data, lines 1650 to 1670, and the keys data, lines 1680 to 1720.

Each bonus letter takes up four number of data in the format *0, screen, X position, Y position* while each key just needs its X and Y position.

When entering the program, don't add any extra spaces, nor type any after the line number, otherwise you may find the program ends with a "No room" error when run.

Once you have typed in the program save it! You can test that you have entered all the DATA correctly by adding these lines and running the program:

```
   1 RESTORE:C%=0:FOR N%=1 TO 282
   2 READ N$:IF ASC N$=45 N$=MID$(N$
,2)
   3 C%=C%+EVAL("&"+N$):NEXT
   4 IF C%<>&3FD1F86 PRINT"Typing er
ror somewhere in DATA""Please check
and try again":VDU7
   5 END
```

Although not infallible, this routine should inform you of most mistakes. Once this has been done lines 1 to 5 should be deleted.

Disc users must download the program before running it.

Full listing starts on Page 140

FUNCTIONS

scr	Returns byte of screen interlocking data.
bs	Returns high and low byte of bonus letter data.
ks	Returns high and low byte of key data.
dec	Returns decimal version of hex number using EVAL.

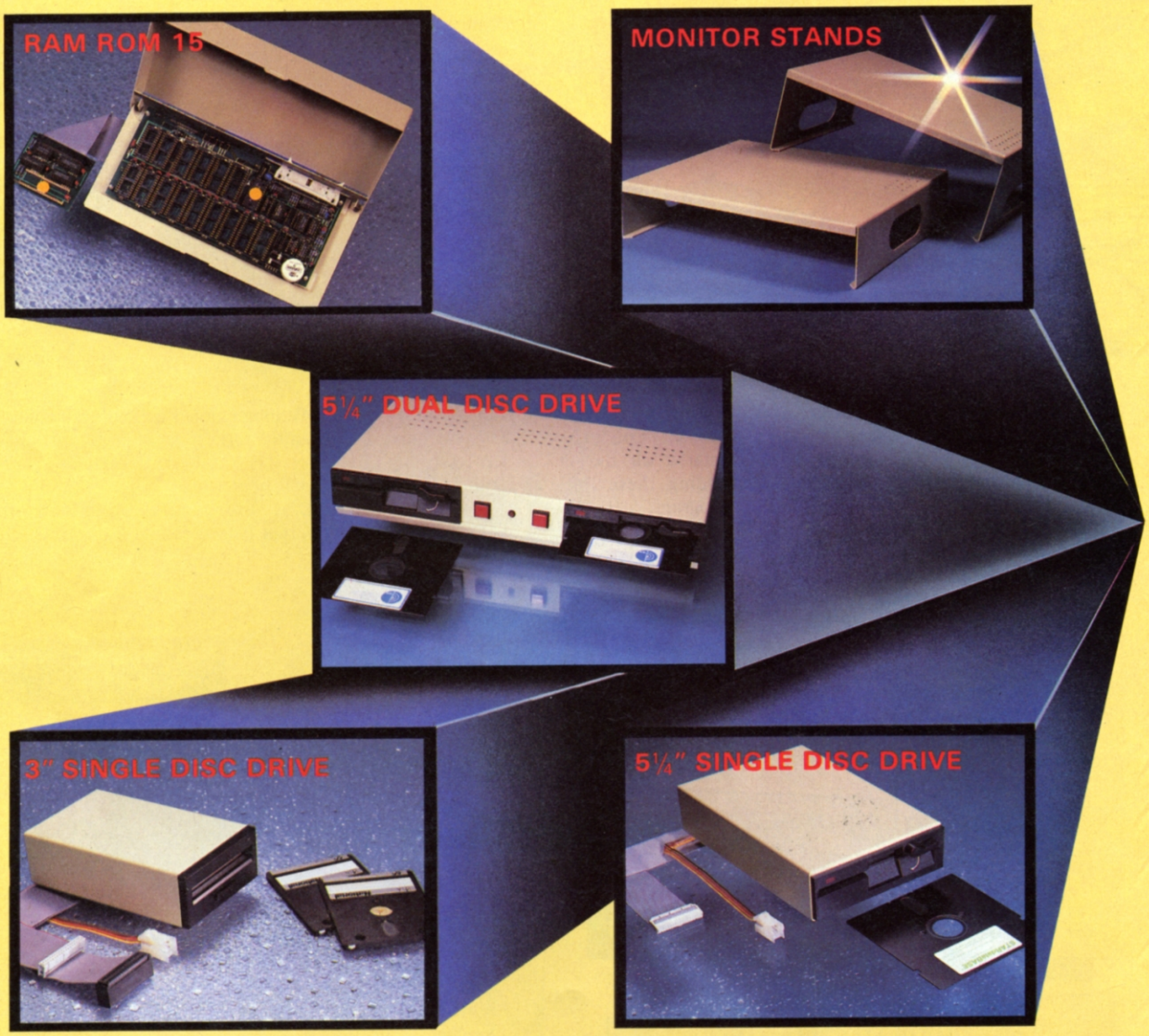
PROGRAM STRUCTURE

10-50	General initialisation.
60-90	Set up UDG characters, display status screen.
100	Main loop starts.
110	Play loop starts.
120-130	Reset various variables.
140-220	Keep playing until all lives lost.
150	Draws current screen.
160-200	Keep playing until life lost/Morris escaped.
210	Morris dead.
240	Gives appropriate message.
260	Displays status screen.

PROCEDURES

init	Initialises variables.
chars	Sets up user-defined characters.
envs	Sets up sound envelopes.
status	Displays high score, skill level and so on.
setvars	Sets various variables.
reset	Resets various variables.
screen	Draws current screen.
man	Moves man, decreases time limit.
key	Erases key, increases score.
letter	Erases letter and adds to *B$*, increases score.
new	Moves man onto new screen.
debris	Moves falling debris.
lift	Moves lift.
scores	Displays scores.
bonus	Prints *B$* inside box.
exit	Draws exit if necessary.
killed	Decreases lives, then pauses.
message	Displays appropriate message.
congrats	Plays tune and awards bonus.
high	Prompts for input of player's name.
read	Reads data up to current screen's.

BBC ? –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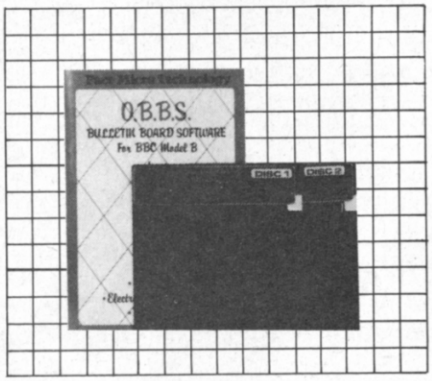

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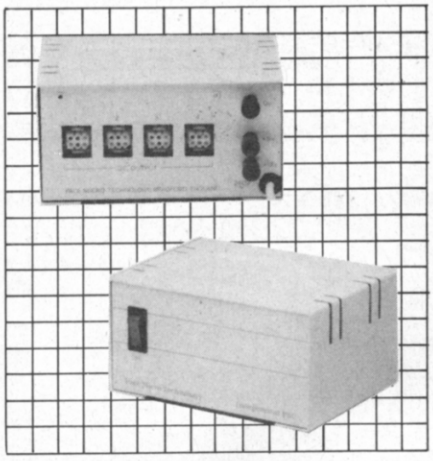

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PACE

A spell with hex, then let's get that first machine code program running

MIKE BIBBY helps make sense of machine code

SO far we have had a look at binary numbers, the sort the micro uses. As we saw, a binary number consists of a lot of 0s and 1s together, each 1 or 0 being known as a bit.

These bits normally come in groups of eight at a time, called bytes. %10101100 is a typical binary number. Notice the % sign at the front – to distinguish it from our normal numbers.

After all, we don't want anyone mistaking it for ten million, one hundred and one thousand or one hundred, do we?

But how do we interpret it? Well, the values meant by the 1s and 0s depend on the column they're in. We're used to this from the old htu (hundreds, tens and units) days of primary school. A 1 in the tens' column meant "one ten", whereas a one in the hundreds' column meant "one hundred". So:

h t u
1 0 0

was very different from:

h t u
1 0

It's much the same in binary. Every column has its value. Figure I shows these values for each column of a byte. Notice how the first column is column 0 – micros start counting at 0.

To arrive at the value of a binary number, you just add together the values of the columns containing ones. Figure II shows how the %10101100 above translates into 172.

Once you get the knack, binary numbers are quite easy to handle. However one drawback to using binary from a human's point of view is that it's extremely easy to make mistakes with it. All those 1s and 0s can be very confusing, and you can end up writing:

%10110101

when you mean:

%10101101

It can be very difficult to spot where you've gone wrong.

When I deal with binary I always split the bits up into groups of four by putting a wiggly line down the middle. For example, I would write %10110101 as:

%1011∫0101

It's far easier for my eyes to see the pattern of the two sets of four than the whole eight at once.

These sets of four are called nybbles. The left hand nybble, which contains the larger column values, is called the most significant nybble (MSN). The right hand one is called, not surprisingly, the least significant nybble (LSN).

Figure III shows what goes on with the least significant nybble:

Column	3	2	1	0
Value	8	4	2	1

Figure III: LSN values

I think that you'll immediately see that the biggest number it can hold is 15, when all the bits are 1. And, of course, the smallest number is 0. Figure IV shows all the patterns.

nybble pattern	value
0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9
1010	10
1011	11
1100	12
1101	13
1110	14
1111	15

Figure IV: Nybble patterns plus values

You've probably thought to yourself, "So what? Why should I write %1111 when it's easier to write 15?"

And you've got a point. In fact we're going to make it easier than that – we're going to give each of our nybble patterns a code, consisting of a single character.

The code for %0000 will be 0
The code for %0001 will be 1
The code for %0010 will be 2

Yes, you've guessed it, the code is the value of the pattern! So the code for %1001 will be 9.

But what about when we come to %1010? This has the value 10, but we

→

Column number	7	6	5	4	3	2	1	0
Value	128	64	32	16	8	4	2	1

Figure I: Binary column values

Value	128	64	32	16	8	4	2	1
Bit	1	0	1	0	1	1	0	0
=	128	+	32	+	8	+ 4		
=	172							

Figure II: Translating binary

From Page 65

can't use that for the code, since we can only use one digit.

All right then, it's our code, so let's decree that we use A as the code for %1010. Okay, I know it's really 10, and you know it's really 10, but our rule says only one character in the code, so A it is.

You won't be surprised to learn that %1011, which has value 11, will have code B, %1100, which has value 12, has code C, and so on up to %1111, value 15, which has code F.

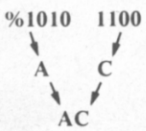
Figure V shows all the nybble patterns, this time with their code and values.

What we've really done is to invent a rule that says, instead of counting 1, 2, 3 . . . 9, 10, 11, 12, 13, 14, 15 we count 1, 2, 3 . . . 9, A, B, C, D, E, F.

For the moment, ignore what happens when we get to 16.

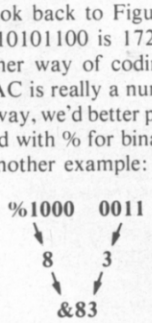
Of course the micro deals in bytes, but we can use our new code for these, too. After all, the most significant nybble is a pattern of four bytes, just like the least significant nybble, so all we do is code each nybble separately, but in the same manner.

Here's how:



If you look back to Figure II you'll see that %10101100 is 172, so AC is really another way of coding 172. To show that AC is really a number coded in our new way, we'd better prefix it with &, as we did with % for binary coding.

Here's another example:



Here %10000011 is 131, and coded in our new way this is &83. Notice how vital the & is. If we didn't have it we would mean 83 in our ordinary system of numbering (called denary) – that is, 8 tens and 3 units – and not 131 as we had intended.

So, with this new method of coding you can code any byte in two characters, one for each nybble. For example, 255 would be &FF. See if you can work out why.

This form of coding is called hexadecimal – hex for short. You'll understand why in a minute.

Just as each column has a value in binary coding, so each has a value in hexadecimal. let's see what they are.

The binary for 15 is:

%00001111 → hexadecimal &0F

The binary for 16 is:

%00010000 → hexadecimal &10

What's going on? Well, to obtain 16

nybble pattern	code	value
0000	0	0
0001	1	1
0010	2	2
0011	3	3
0100	4	4
0101	5	5
0110	6	6
0111	7	7
1000	8	8
1001	9	9
1010	A	10
1011	B	11
1100	C	12
1101	D	13
1110	E	14
1111	F	15

Figure V: Nybble patterns plus codes

from 15, we have to add one, so our hex sum is

```
  &0F+
  &01
 ----
  &10
```

What's happening is that we "put 0 down, carry one" when we get to 16. In normal sums we do this when we get to 10 – and the 1 goes in the tens column.

In hexadecimal we carry when we get to 16 – each unit in the second column is worth 16.

That's why I said don't worry about what happens when we get to 16. When we get there, we carry.

This, incidentally, is why it's called hexadecimal – the hex is for six, the decimal for ten – hexadecimal, the number code based on sixteen.

This means that:

&10 is 1 sixteen + 0 units = 16
&17 is 1 sixteen + 7 units = 23
&1B is 1 sixteen + 11 units = 27
&20 is 2 sixteens + 0 units = 32
&3C is 3 sixteens + 12 units = 60
&A3 is 10 sixteens + 3 units = 163

and so on . . .

That 16s column can present you with some hard sums, so Figure VI provides a sort of ready reckoner for you, telling you the value of a hex digit for each column.

Hex Digit	Value in 16's column	Value in 1's column
0	0	0
1	16	1
2	32	2
3	48	3
4	64	4
5	80	5
6	96	6
7	112	7
8	128	8
9	144	9
A	160	10
B	176	11
C	192	12
D	208	13
E	224	14
F	240	15

Figure VI: Hexadecimal Ready Reckoner

Fine, we can now write the value of a byte as a two digit hexadecimal number. This, however, is limited to a maximum of &FF, or 255.

As we saw last time we need larger numbers than this to specify the 65536 memory locations the 6502 addresses.

What we did was to specify our memory address with two bytes, high bytes and low bytes. In hexadecimal it's two digits to a byte, so we can specify any address with 4 digits instead of the cumbersome 16 bits we used last time.

Figure VII shows how it works.

Just as in binary, we kept doubling our column values, so in hex we keep multiplying by 16. Hence the following values apply:

Column 1 1 = 1
Column 2 1×16 = 16
Column 3 16×16 = 256
Column 4 256×16 = 4096

This is quite sensible when you think about it. If the low byte were &FF (255), that is, as big as a single byte can hold, and we added one, we'd have to show somehow that we'd arrived at 256.

We can do this by adding a one to the first column of the high byte (which is

Column	high byte		low byte	
Number	3	2	1	0
Value	4096	256	16	1

Figure VII: Four digit hex column values

worth 256) and setting the low byte to &00 – in other words, put 0 down and carry 1.

The sums might get a bit hard if your mental arithmetic's a bit rusty, but you can translate from four digit hex addresses quite straightforwardly.

For instance:

```
&0202 = 2×256 + 2                          =  514
&1A10 = 1×4096 + 10×256 + 1×16             =  6672
&FFFF = 15×4096 + 15×256 + 15×16 + 15×1    = 65535
```

If you want to translate from our normal numbering system, denary, to and from hex, the BBC Micro makes it easy for you. To see the hex equivalent of the denary 6672, enter:

```
PRINT ~6672
```

and you'll see displayed 1A10 (regrettably without the &). The special character ~ (a tilde) indicates that the result should be given in hex.

To convert back to decimal we enter:

```
PRINT &1A10
```

and you'll see:

```
6672
```

The ampersand, &, tells the BBC Micro that the number following it is in hex. If you omit the & the micro assumes the number is in denary. See what happens when the & is missed from the previous example.

```
PRINT 1A10
```

The error is produced because A is not a valid decimal digit.

What do you think will happen if you enter the line below?

```
PRINT ~&1C45
```

Surprised? You shouldn't be. All you've done is asked the micro to print the hex value of the hex number &1C45.

Unfortunately, the BBC Micro isn't as useful at translating to and from binary. But don't worry, most of the time you'll be working in hex and denary.

Anyway, enough of this number theory. Let's do some machine code.

We have already discovered that machine code is a sequence of bytes in memory that gives the micro certain tasks. All you do is point the micro at the first byte of the machine code and say go.

That gives us three problems.

First of all, we have to decide where in memory to put our machine code.

Secondly, we have to actually put the correct sequence of bytes into those memory locations.

Thirdly, we have to tell the micro to go and do the machine code instructions.

Finding a safe place to store our program is rather tricky. Several free areas exist below PAGE, but using them can produce side effects.

For example, pages &B (&B00-&BFF) and &C (&C00-&CFF) contain the soft key and character definitions. If we use either of these areas at all we run the risk of destroying the definitions held there.

For the moment we will store our programs starting at &900. This is a fairly safe position for simple programs.

Now that we've found a convenient place for our program we must solve problem two – how to enter the correct series of bytes into memory.

One way is to poke the bytes directly into memory using the query operator, ?. But before we can do this we must find out the instruction bytes for the task we wish to perform. Let's suppose we're going to enter and execute the following simple program which displays a letter A on the screen:

mnemonics	instruction bytes
LDA #&41	A9 41
STA &7D00	8D 00 7D
RTS	60

The left hand side shows the mnemonics for the program instructions we're using. These make it easier to understand the "flow" of the program. To the right are the instruction bytes which consist of the opcode followed by relevant data bytes – the 6502s actual code for the mnemonics.

Let's look at what our program does by examining each of the instructions in turn.

LDA#&41: LoaDs the Accumulator with the hex number &41 – the Ascii code of A. In Basic this is something like:

```
LET A=&41
```

STA &7D00: STores the Accumulator in location &7D00. If you don't know already location &7D00 is part of the Mode 7 screen. When a number is poked into the screen memory the corresponding Ascii character appears on the screen. This is not the case in Modes 0 to 6, however.

The Basic query operator does the same thing as instructions such as STA. Thus in Basic we would use:

```
?&7D00=A
```

Notice that the data bytes representing the low and high bytes of the

→

PROBLEM

I HAVE a BBC Micro with Solidisk 1.9 DDFS and a Mitsubishi 4853 80 track drive. I wish to replace the Solidisk DDFS with an Acorn DFS, but wish to retain the Mitsubishi drive.

At present the Solidisk DDFS senses automatically whether the disc in the drive is 40 or 80 track and acts accordingly. Would it be possible to incorporate a switch on the disc drive to change from 40 to 80 track when used with the Acorn DFS?

If so, could you please indicate how to wire it. I have tested the disc drive on another BBC B fitted with Acorn DFS and it works OK with a 40 track disc. – E.L. Firth, Pickering.

SOLVED

I assume your drives are 80 track and the DDFS was double stepped. There is no reason why the drives will not work with the Acorn system.

However if you want to read 40 track discs you will need either the Watford DFS which will allow you to switch in software or else my disc drive switcher (Body Build, October 1985) which will do the same in hardware allowing you to use the Acorn DFS.

Mike Cook

From Page 67

location being "poked" (&7D00) are in reverse order. This is why &7D00 is stored as &00 followed by &7D. You'll find that all low and high bytes are stored in this way.

RTS: Causes the 6502 to return from whence it came. It's just like the Basic instruction RETURN or ENDPROC which cause the program to continue executing from the place it was called from.

The final Basic version of the machine code routine is:

```
10 LET A=&41
20 ?&7D00=A
30 RETURN
```

Since both the machine code program and it's Basic equivalent are subroutines they must be executed as subroutines. Thus we use GOSUB 10 to RUN our Basic version.

The next program demonstrates how our machine code program can be poked into memory:

```
10 MODE 7
20 mcode=&900
30 ?(mcode+0)=&A9
40 ?(mcode+1)=&41
50 ?(mcode+2)=&8D
60 ?(mcode+3)=&00
70 ?(mcode+4)=&7D
80 ?(mcode+5)=&60
```

RUNning the program appears to have no effect at all. However, a six byte machine code program has been stored in locations &900 to &905.

As you can see from the listing, working with just hexadecimal numbers makes it almost impossible to understand what's going on. Fortunately we can do away with massive lists of hexadecimal numbers by using the BBC Micro's assembler which allows us to type programs in as mnemonics.

To get the BBC Micro to run a machine code program held in memory we use the CALL command. Such as:

```
CALL &3000
```

This, if you like, is a sort of "GOSUB from Basic to the machine code routine that starts at &3000". So to call the machine code program we poked into memory earlier we would enter:

```
CALL &900
```

and if all is well the letter A will appear in the top section of the screen.

The micro GOSUBs to our routine and does what the program there tells it. In this case it merely displays an A, and you end up back in Basic.

All right, nothing spectacular has happened – but it worked, so congratulations! You've just run your first machine code program.

● *Well that's all for this month. Next time we'll be looking at the BBC Micro's built-in assembler.*

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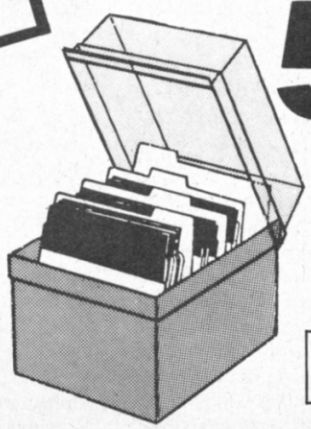

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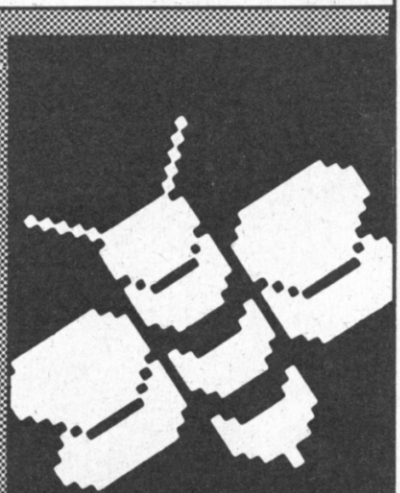

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External views includes Horizon, other aircraft, a network of ground detail points, **separate landing runways and animated 'strobe' approach lighting.** NO 'chunky' pixels, all objects are drawn in fine, high resolution coloured lines. **The view is recomputed and redrawn 15 times every second.**

AIR TO AIR COMBAT

Warning There are no 'lives' but your single one, your score is zeroed and the program restarted if you are shot down or crash. This motivates you to try and 'bring home' a damaged aircraft. May different forms of damage can occur. Most are survivable, eg a gear up runway landing if smooth enough. **If you can't land, use the EJECTION seat and survive.**

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BBC 32K ELECTRON versions

EU3

Last month *The Micro User* presented the first hands-on evaluation of the BBC Master. We called it "the most exciting new product from a British computer manufacturer since the original BBC Micro".

This month our technical editor takes the story a stage further with a look inside the wonder machine . . .

The Master revealed

By MIKE COOK

IT is always exciting getting your hands on a new computer, and the BBC Master is no exception. On first impressions it looks much wider than the Model B, but in fact proves to be only two inches more.

Nevertheless this means that it would no longer slip under my monitor plinth and my disc cable was only just long enough.

The main keyboard has been pushed to one side as the "ash tray" speech extension socket has gone, along with the speech synthesiser.

At the right hand end is a new numeric keypad. The Break key is set slightly apart from the other keys and there is a small plastic screw that can be used to mechanically prevent it from being pressed.

The Master also seems to have a thicker plastic moulding, giving it a more sturdy feel. Needless to say it is coloured in the obligatory almost, but not quite, matching shade of beige that so many manufacturers are struck on.

What I want to know is how many pieces of equipment do I need to buy before two actually match?

The Master has a slightly different switch-on tone from the Model B and a better sound quality. To double check this I ran some music programs and found the sound to be much richer than on the earlier model.

I reached for the manual and started flicking through it in my customary direction – back to front. At first the appendices looked encouraging, but the further I looked into the body the less impressive it became. It is without doubt one of the worst manuals that Acorn has produced.

When you consider that Brian Long, the managing director of Acorn, said on television that the machine was targeted at scientists, schools, colleges and serious home users, why could he not have told that to his manual writers?

It is aimed at the first time "Let's not put you off computing" user and is afraid to tell you anything that you might need to read more than once to understand.

An example of this is the chapter that tells you not to feel a Wally if you don't want to learn to program. It then makes it difficult by only listing one line as a description of each Basic command. It does not even given an example of syntax.

On the first page you are informed that if you want to know about what you have bought you should buy the two volume Reference Manual and the View and ViewSheet guides. Consequently we are left to guess the improvements incorporated in this computer.

What the designers of the Master seem to have done is to look at the system people ended up with after upgrading the Model B, and have presented it all in one package, and quite a good job they make of it – apart from the manual.

So the Master consists of a computer with built-in sideways and shadow RAM, along with a disc interface. There is also ROM-based software comprising a word processor, spreadsheet, terminal emulator, editor, Basic language and two disc filing systems.

While it is true that most of the Master's features could be obtained as an addition to the Model B, nevertheless it is quite a package.

While shadow RAM can give you extra space for programs on either machine, what can't be done on the good old Model B is that either the shadow RAM or the main RAM can act as the display memory.

In addition to that you can access either area with the PLOT commands independently. What that means is that you can display a picture in the main RAM while you are constructing another in the shadow RAM. When it is complete you can quickly switch over and display the new picture. This allows

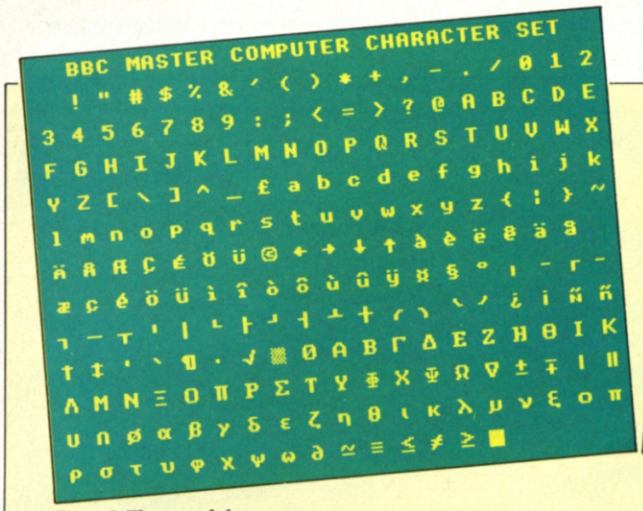

Figure I: The normal character set

Figure II: The italic character set

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you to do some pretty nifty animation.

The Master has an improved character set (see Figure I) which includes Greek and some mathematical symbols. What is more, each character can be software defined so that you can construct your own fonts. Figure II shows the italic character set that is in a disc file.

On the hardware side there is a battery backed up real time clock and RAM. This enables the time and date to be always available, as well as allowing some options to be automatically selected on power up.

The Basic runs faster than the Model B due to the extra instructions in the 6512 CPU. However page 40 of the manual suggested that it also included syntax checking of typed-in program lines. Unfortunately this proved to be an error. The Basic also includes a number of extensions in the graphics area.

There is a Welcome disc and tape giving some good demo programs and useful utilities. I gave the machine a good work out with software I already had. The only part I did not try was the Terminal emulator. This was because all the manual had to say about it was that you got in by typing *TERMINAL and it was far too complex to describe in this manual. It took half a page to say this. The other half could have given some hints on how to set the baud rate!

When I can lay my hands on the reference manuals perhaps I will be able to get down to some serious work with the Master. It is a machine that deserves serious study. I am sure that it can out-perform many so-called 16 bit machines. I am especially looking forward to the second processor options. It should prove to be a solid computer for some considerable time yet, and ensure that the BBC Micro goes marching on.

BASIC

THE Master comes with two types of Basic, one ROM based and the other disc based. The former, Basic IV, operates faster than on the Model B and contains several enhancements over Basic II.

Perhaps the most useful for developing programs is the LIST IF command. This allows you to specify a string and the line will only be listed if it contains that string.

For example, how many times have you searched through a long listing looking for a procedure definition? Well, by typing LIST IF DEF, all line numbers containing DEF will be listed.

This could also be useful if you want to change the name of some variable – this function can quickly and easily point you to the lines where you have used it. It would even be a help in tracking down errors when you are typing in listings.

The real time clock is accessed by a Basic variable *TIME$*, and gives the day, date, year and time. As I am looking at it now it is displaying Sun, 19 Jan 1986. 19:08:58. By using the appropriate string statements you can extract the element of the time you want. As it is a system with battery backup you don't need to reset it when you first switch on.

The other major improvement is the area of the graphics commands. A lot more graphics primitives have been added. These allow you to specify a single command to draw rectangles, circles, parallelograms, ellipses and arcs. These shapes may be drawn in outline, solid or pattern form.

As these shapes are defined in machine code they work a lot faster than the equivalent Basic program.

You can use four different patterns straight off, but can define your own using the VDU23 command. The size of the pattern grid depends upon the mode. It is always 8 units high and 2, 4 or 8 wide, so the pattern occupies one byte of memory. These patterns can even be used by the other commands to draw circles or lines in a dotted pattern.

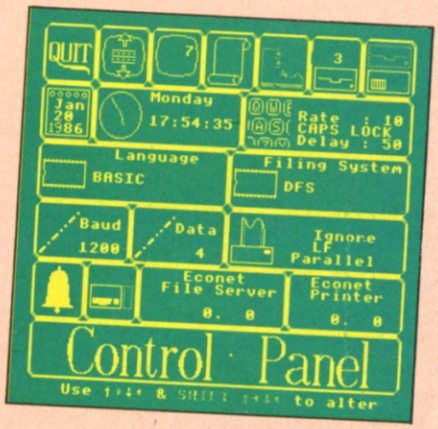
There are two variants on the flood fill routine: fill until non-background and fill until non-foreground. As well as flood filling in a solid colour you can also flood fill in a pattern. Unfortunately there must be some bug in the software or algorithm as some patterns caused the flood fill to stop prematurely. This happens using two of the default patterns in the two colour Modes 0 and 4.

The most useful improvement to the graphics is the rectangle copy and move

START UP OPTIONS

ON the Model B every time you powered up you had to set options to suit your needs, such as if you wanted to use a serial printer instead of a parallel one.

The Master remembers these choices once made in the battery backed up RAM. These choices can be set from the operating system's *CONFIGURE command or the disc-based utility control panel.



Vertical screen alignment *The display can be moved up and down to centre on your screen.*

Mode select *Power up screen mode.*

Scroll protect *To stop the screen scrolling when you type on the last position on a line.*

Boot option *The conditions when the system accesses a !BOOT file.*

Drive control *Delay times used in your disc drive.*

Disc type *5.25in, 3.5in, 3in or Winchester.*

Date *Day, month and year.*

Day and time *Day of the week and time.*

Keyboard *Auto repeat delay and repeat rate along with whether the caps lock is on.*

Language *Computer language first entered.*

Filing system *Power up filing system.*

Baud rate *Speed of the RS423 serial interface.*

Data *RS423 data format.*

Printer *Defines the character a printer ignores and whether to use a serial or parallel printer.*

Sound *Mutes the start up sound and reduces the level of standard bleeps.*

Co-processor *Defines an internal, external or no second processor.*

File server *For network users defines the file server to use first.*

Printer server *For network users defines the printer server to use first.*

instructions. As their names imply, you can define a rectangular area and make a copy of that area anywhere on the screen.

When you move a rectangle the defined area is first erased before being copied to the new screen position. Using this command it is quite easy to achieve animation from a Basic program that previously required machine code.

Using these commands you can in effect program your own sprites.

There are eight new graphics modes, but don't get too excited because they are the same as the old ones with 128 added. For example, you can type in Mode 2 or Mode 130, the difference being that using the higher numbers you automatically switch on the shadow RAM and so HIMEM is set at &8000, giving you more program space.

The graphics extensions are similar to the Acorn graphics extension ROM for the Model B. However the extension ROM is in some ways more powerful, as it allowed the defining of several sprites.

BAS128 is a version of Basic found on the tape or the 80 track version of the disc. What it does is to load into memory where your program would normally be and configures the sideways RAM into 64k of contiguous memory for your Basic program. This gives a lot of space for you to write programs.

You might be alarmed when you print the variable PAGE, which is set at & 10000. But don't worry, HIMEM is set at &20000. This means when using indirect operators in the Basic storage space you will be dealing with a 17 bit pointer.

Because of this the assembler variables *P%* and *O%* are also defined to 17 bits, which means that when they are between the values of &00000 and &0FFFF everything is the same as before.

However when these variables are between &10000 and &1FFFF they will actually be addressing sideways RAM, so the assembler has to convert this into the appropriate 16 bit value. Therefore you cannot jump from one sideways RAM bank to another in machine code. Any attempt to direct the assembler to do this will give a BANK error.

Similarly, if your code is assembled over a bank boundary it will not run, so the error WRAP is produced. BAS128 does not have the *TIME$* variable available nor the LIST IF command. Also you cannot enter the editor with an EDIT or EDIT IF command.

All the shuffling about between sideways RAM banks slows the Basic down and it is slower than the Model B Basic.

In order to put these versions of Basic to the test I tried some simple programs. I ran each on the Model B, Master BASIC IV and BAS128.

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Program I was just an empty FOR, NEXT loop going round 20,000 times. Program II was a similar loop going round 200 times only, each time calculating the SIN of the loop variable. Finally Program III was a graphics program making plenty of screen accesses.

The results are shown in Table I.

Program	Time in seconds		
	Model B	*BASIC IV*	*BAS128*
Program I	10.62	9.70	20.01
Program II	4.81	2.74	5.53
Program III	88.46	64.48	116.93

In all cases the old Model B is between BASIC IV and BAS128. I am not suggesting that these are definitive speed comparisons but should give a rough guide to operating speed.

Table I: Basic time comparisons

A TRIP AROUND THE CHIPS

IT has been said that "manners maketh man", but "chips maketh the machine". So let's take a quick trip around the inside of the Master to see what changes have been wrought.

You can squeeze a lot more power out of a computer if you manipulate the hardware directly. This means that to be compatible a new machine must have not only the same hardware but it must be positioned in the same place in the memory map.

Well most of the major chips used in the Model B are there in the Master. Despite what other magazines say, the Video and Serial ULA are still there, along with the 6845 CRT controller. The same sound, ACIA and teletext chips are there as well, and in the same place.

The user port and printer port are reproduced, as is the analogue to digital converter. What is different is the system VIA. It is still there talking to the sound chip, but it is no longer connected to the keyboard. From the look of the circuit it appears to be connected to the disc controller chip, which is a 1770 and not the 8271 of the Model B.

The most numerous new additions are custom chips labelled TAHC06. There are five of these scattered about the board, and one is definitely in charge of the keyboard. Therefore it must be assumed that these are some form of input/output chip. Perhaps some of them deal with the needs of future internal second processors.

The newest large chip is the HD 146818 real time clock and CMOS RAM. Being battery backed up it allows continuous updating of the time and the storage of default start up parameters. There is also a custom chip TAHC03 next to it but as yet I don't know what that does.

Those are the chips that matter to the software. Some changes have been made that have no direct effect. One area lies in the memory. In the Model B it took 16 chips to hold 32k of memory, in the Master there are just four chips holding 128k.

The firmware is on one massive ROM chip: It is a 128k byte, or a 1 mega bit, chip. It is mounted on a small header with an address decoding latch soldered underneath it as the sockets are designed for 32k or 16k ROMs.

The Tube is now buffered with a 74LS373 and the serial port drivers have been changed to VA9637 and AM26LS30.

OPERATING SYSTEM 3.20

THE Master has a new version of the machine operating system containing a number of new commands to control the new features. As with all the past operating system commands, they should be prefixed by an asterisk.

There is a CONFIGURE command to alter the state of the computer's start up options and a STATUS command to show you what they are. One useful set of commands allow you to UNPLUG or INSERT a sideways ROM to stop them fighting each other. You can display what ROMs are in what sockets and whether you have disabled them. You can also access the strings inside the red function keys with the SHOW command.

There are commands to control shadow RAM and also to move data in and out of sideways RAM. You can also move files from one filing system to another and change their names in the process.

A couple of useful commands for those of you with second processors are GO and GOIO. These execute a machine code program in the second processor or input/output processor.

All in all, the new operating system calls represent perhaps the biggest new software element in the BBC Master computer.

COMPATIBILITY

WHEN viewing the question of compatibility of different computers

ROM BASED SOFTWARE

MOS *Machine operating system version 3.20.*

BASIC IV *The Master's version of Basic running about 40 per cent faster than a Model B.*

View *A word processor of considerable sophistication either loved or hated by users. (I hate it).*

Viewsheet *A spreadsheet for organisation and calculation of related data. It is especially useful in allowing you to see the effect that changing one item has on the whole structure.*

Editor *A simple text editor that can be used for creating source files for language compilers or interpreters. It does not have the text formatting capabilities of View and is much easier to use.*

Terminal *A terminal emulator which enables you to communicate with a remote computer directly or by telephone via a modem.*

DFS *Disc filing system. This allows saving and loading of programs and data to disc using the same format as the Model B.*

ADFS *Advanced disc filing system. A double density system using both sides of the disc, operating a hierarchical directory structure.*

you must always remember that it is like a dog walking on its hind legs; the wonder is not that it is done well but that it is done at all.

Therefore it follows that the designers have gone to a lot of trouble to make the new Master look like the Model B. Unfortunately it only takes one incompatible feature to make a program not run properly.

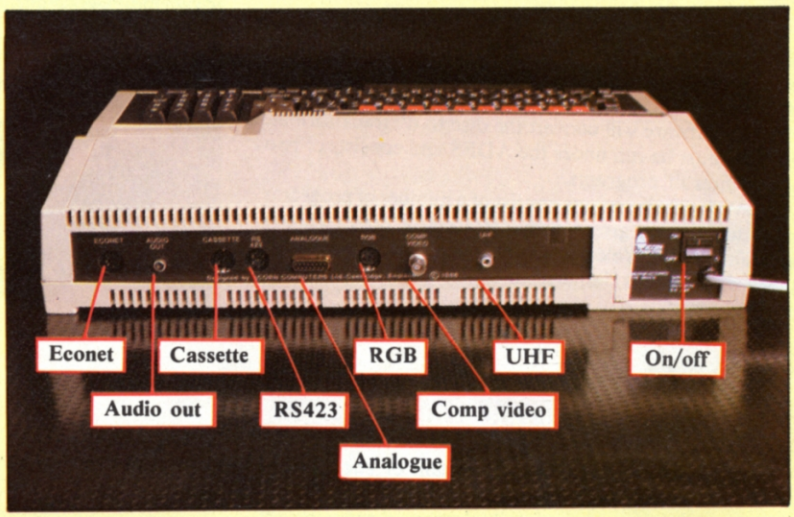
Perhaps the most common cause of incompatibility is the attempt to protect some software from being copied. To do this the disc controller chip is addressed directly. As the Master has a different disc controller chip than the Model B, programs protected in this way will not run. This applies not only to games but to other packages like Island Logic's The Music System.

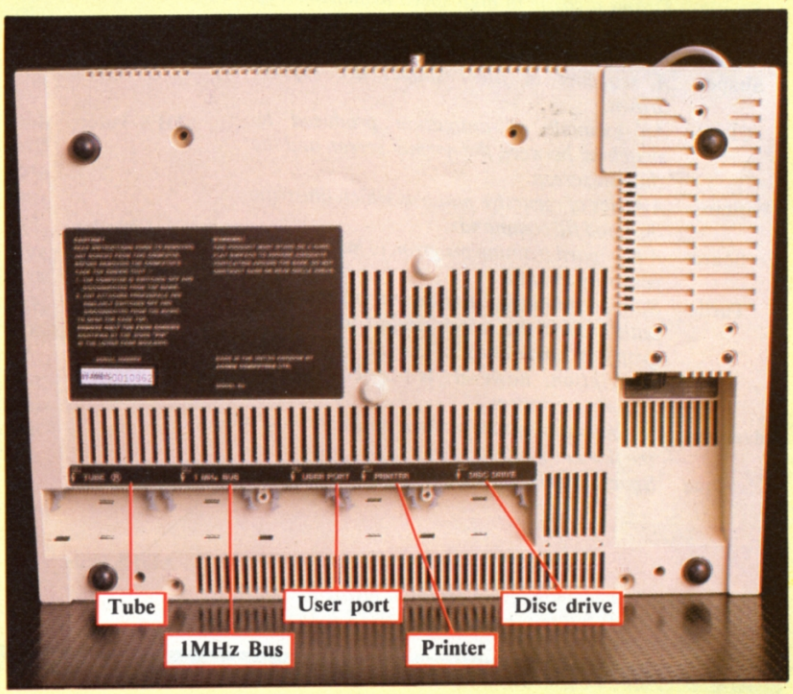
It is possible for software houses to bring out new versions and let you trade in your own version for a nominal fee. However in the cases where the software houses have gone out of business or you are in the unfortunate position of having lost the original disc you are stuck.

Some incompatibility is caused by software tricks not being appropriate to the new system. For example, a favourite ploy is to use the font area of the operating system in order to create large letters on the screen. Unfortunately in the new system they are somewhere else, so the program runs but instead of large characters random blocks are produced. This happens on most of the programs on the excellent *Micro User* Fun School packages.

Despite having a mention in the manual, my version of Elite will not run on the new machine. In fact when you try to run it the game informs you that the computer is not a BBC Micro!

There is, however, a utility on the





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Welcome disc that claims to "convert" some software. When trying this on my version of Elite the program conceded that it was a BBC Micro but then sent the disc read head on a never ending quest for some sector.

The utility changes the way INKEY(255) works, but despite that I have not found a program that this utility will convert. The popular Micro Olympics will load in, but crashes as the event is about to start.

Another reason for incompatibility comes from the way some programs are transferred from tape to disc. I found some programs being downloaded without even checking to see where PAGE was. By removing this downloading step the programs could be made to run.

Some commercial software worked perfectly, like Acorn's Music 500 language, Ample. I think the maxim must be: "Don't expect it to work, but be surprised when it does".

WELCOME SOFTWARE

THE Welcome programs are supplied on tape and disc. The disc is a 40/80 track configurable disc. In its raw mode it is a 40 track disc. However in order to run it on an 80 track drive the software will convert the disc to 80 track format. The disc must be run under the ADFS and consists of two major suites of programs.

The Welcome programs consist of a number of programs linked together to give a demonstration of the machine's capabilities. The Welcome utilities give a menu selectable choice of programs designed to exploit the features of the Master series.

WELCOME PROGRAMS

Modes *This gives a demonstration of each screen mode, its colours and resolution.*

Castle *Draws a castle in high speed demonstrating the new graphic shapes available in Basic.*

Clown *As above only a clown's face is drawn.*

Shapes *A sequence of filled shapes are rapidly drawn.*

Cloud *An example of animation produced by switching between the normal screen and the shadow screen.*

Patterns *A series of recursive patterns which illustrate the flood fill commands.*

Keyboard *A keyboard training program to help you find your way around.*

Turtle *Simple commands may be entered to trace a path around the screen similar to the turtle graphics commands of Logo. The correct description, however, is a body-centred coordinate system.*

Adventure *A simple adventure written in Basic to give the flavour of adventure games.*

Aqua *Space Invaders set underwater.*

WELCOME UTILITIES

Panel *A machine code program giving access to the battery backed up CMOS RAM..This sets a switch-on, default configuration for the computer. See previous page.*

Timpaint *A program allowing you to create pictures utilising the extra graphic commands. Rubber banding with cursor keys or joystick complements the icon style mode select menu.*

Dbase *A very simple database program consisting of four records for up to 100 people. This program is not available on the tape.*

ADFS-Tutor *A tutorial for the Advanced Disc Filing System, showing graphics of a hierarchical directory structure and inviting you to type in path and file names.*

Chardes *A program allowing you to create and save your own fonts. This allows special symbols to be created.*

Envel *An envelope editor for use with the SOUND command. The value of each parameter is shown in a box which can be altered when selected by the cursor. Some keys will play the sounds so you can tailor them to your needs. The function keys have preset envelopes in them to give you a start.*

Pfill *An editor allowing you to define the pattern used for flood fill and solid graphic shapes.*

ADFS Utils *All the utilities they couldn't fit in the ADFS ROM along with a help file on each.*

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As we were saying...

Part 3 of PETE BIBBY's series for the micro novice

LAST month we covered the use of variable names, labels that stand for a number.

We saw how we could use the Basic keyword LET to store a value in a variable such as:

```
LET price=5
```

or:

```
LET bought=10
```

and then use them in calculations as:

```
PRINT price*bought
```

shows. We also learnt how the values stored in variables can vary, although as yet we haven't made much use of this.

Let the names make sense

Last month we looked at the rules for variable names and saw what the BBC Micro accepts and what it rejects. These are the formal rules. If you don't obey them the program won't work as the micro will grind to a halt whenever it meets a name that breaks the rules.

In addition to these rules there are a couple of useful rules of thumb for variable names. They're not mandatory, the program will still run if your labels don't obey them. Having said that though, obeying them does make life easier when you get on to longer problems.

The first tip is to use lowercase letters in variable names. In other words it's better to use:

```
LET bill=100
```

than:

```
LET BILL=100
```

There are two reasons for this. The first is that it allows you to easily distinguish between keywords (in capitals) and variable names. This makes the reading of listings simpler. Also it avoids the possibility of a clash between a keyword and a variable name. To get the idea try:

```
LET PRINT=5
```

as opposed to:

```
LET print=5
```

The second point is to use meaningful variable names. If you want to find the area of a rectangle of length 20 and width 10 you can use:

```
LET x=20
LET y=10
PRINT x*y
```

to calculate the result. However, it's not very informative is it? The names *x* and *y* are fairly anonymous.

A better version of the lines is:

```
LET length=20
LET width=10
PRINT length*width
```

and even better is:

```
LET length=20
LET width=10
LET area=length*width
PRINT area
```

I admit that the last two versions need more typing but they're much easier to follow, reading almost like English. Take my advice and use meaningful variable names. It makes life a lot simpler when you come to writing long, complicated programs.

Yet more on names

Having waxed eloquent on meaningful variable names and exhorted the use of lowercase letters I'll now go on to ask you to use capitals in them.

This is because as you use meaningful names you'll find that they tend to get longer and you end up with lines like:

```
LET costofmicrouser=1.25
LET costofelectronuser=1.00
```

These are allegedly meaningful variable names but to me they're fairly incomprehensible. It would be much better if the words that made them up were split somehow. Usually the underline sign _ is used for the job resulting in:

```
LET cost_of_micro_user=1.25
LET cost_of_electron_user=1.00
```

The trouble with this is that people tend to get the underline, which is allowed in a variable name, confused with the hyphen, which isn't. And it means even more typing. A better alternative is to use the odd capital letter to make things clearer as in:

```
LET costOfMicroUser=1.25
LET costOfElectronUser=1.00
```

String variables

By now the use of LET to store numbers in variables should be familiar. In fact all the variables we've dealt with so far have been these numeric variables, as they are known. We can also use variable names to stand for strings of characters.

These string variables follow the same rules as the numeric variables we're used to. The difference is that the name of a string variable must end in the dollar sign, $, and the string of characters must be enclosed between two quotation marks.

So if we have a string of characters

→

From Page 79

such as *Any characters* we can store them in a variable with a line like:

```
LET example$="Any characters"
```

and recall them with:

```
PRINT example$
```

Notice that the variable name *example$* ends in the dollar sign to show the micro that it's a string of characters that we're storing, not a number. And the string *Any characters* is enclosed between quotation marks. Try:

```
LET example="Any character"
```

or:

```
10 LET example$=Any character
```

and see what happens.

Although it may not be immediately obvious, string variables are important beasts. One trivial, though nevertheless helpful, use is as a sort of shorthand. Imagine a case where a program had the line:

```
PRINT "Press Return to carry on"
```

several times. It would save a lot of time, trouble and typing if you used a string variable to store the message, as in:

```
LET message$="Press Return to carry
on"
```

and then call it up with a:

```
PRINT message$
```

whenever it's needed.

And now to program

We've only had one program in this series, the wonderful:

```
10 PRINT "anything"
```

Once we'd typed this in we could clear the screen with CLS and then refresh our memory as to the program in the micro's memory with a quick LIST. And, for real excitement, we could run the program with a RUN command. The result is:

```
anything
```

appearing on screen. With what we know about string variables we can now alter this program a little. Try typing in:

```
10 message$="anything"
20 PRINT message$
```

and RUN it. The result is the same. All right, the program takes two lines instead of one, so it's not as efficient, but it does have some interesting features.

Notice that we now have a program consisting of two lines 10 and 10. Also notice that when we typed in:

```
10 message$="anything"
```

our old line 10:

```
10 PRINT "anything"
```

disappeared. So if you want to replace a program line with a new version just type the new line in and it will supersede the old one.

Another point to examine is that we have a two line program. When the BBC Micro receives a RUN from the keyboard it takes the line with the lowest line number, in this case 10, and obeys it. It then goes on to the next line number, 20, and obeys that. It carries on

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like this until it runs out of line numbers when, understandably, it stops.

The last thing to notice is that line 10 of our program has no LET in it. We have:

```
10 message$="anything"
```

instead of:

```
10 LET message$="anything"
```

which you might have expected.

As you'll have guessed from this, you don't have to use LET when you store a value or a string in a variable. I've only used it because at first it helps to make clear what's happening. I'll let you off using it in future.

Order, order

Keen, observant and intelligent readers like you will have been struck by the fact that the line numbers of our second program go up in tens. They might well ask themselves: "Could they go up in ones?"

The answer is yes. We could have:

```
10 message$="anything"
20 PRINT message$
```

rewritten as:

```
1 message$="anything"
2 PRINT message$
```

and it would still work. The micro would look for the lowest line number, in this case 1, and obey that. It would then take the next line number, 2, and process that.

But although this works, I wouldn't advise you to do it. The convention is that line numbers go up in tens and it's a good convention. Suppose, for reasons best known to yourself you suddenly wanted to add a line to the program to print *something* before *anything*. With lines numbered in tens as in:

```
10 message$="anything"
20 PRINT message$
```

this is easy. You can just type in:

```
15 PRINT "something"
```

and you're away. The micro automatically places the line in the right position. You'll see this if you use LIST to list the program giving:

```
10 message$="anything"
15 PRINT "something"
20 PRINT message$
```

With the line numbers going up in ones as in:

```
1 message$="anything"
2 PRINT message$
```

you're stuck. The line numbers have to be positive integers (whole numbers) so:

```
1.5 PRINT "something"
```

won't work. So stick to the convention of numbering in tens, it allows room for afterthoughts.

The third program

Dazzled with the success of our previous efforts, let's go on to another program. This one will calculate the area of a rectangle of sides 20 and 10 units. One version of doing this is:

```
10 REM Program III
20 length=20
30 width=10
40 area=length*width
50 PRINT "The area is ";area
```

When RUN it gives you the answer 200 square units. Lines 20 to 50 should give you no problem. They're just what we typed into the micro in immediate mode. All the program does is to store these operations in the micro's memory until a RUN gives them the go-ahead.

What we haven't seen before is the keyword REM. This is short for REMark. This, unsurprisingly, allows you to annotate your programs with remarks. Anything on a line after a REM is ignored by the micro, so anything you put there is just for the benefit of humans reading the listing. The micro doesn't want to know. As soon as it meets a REM it looks for the next line number.

So you could have:

```
10 REM this is ignored
```

or:

```
10 REM Hello mum
```

instead of:

```
10 REM Program III
```

in the above program. All my choice of REM does is to label the program so that when I refer to Program III you know which one I'm talking about.

Strangely enough, although REMs don't really do anything they are important. Wise use of REMs and meaningful variable names can make a program easy to follow and so to correct and modify. Use them!

Another program

Program III is a bit limited. After all, it just works for one rectangle of length 20, width 10. If I now wanted to find the area of a rectangle of length 15, width 5, I would have to use another program, Program IV.

```
10 REM Program IV
20 length=15
30 width=5
40 area=length*width
50 PRINT "The area is ";area
```

However this isn't as bad as it might seem as it's really the same as Program III. Provided you've still got that one in your micro's memory all you have to do is type in:

```
20 length=15
30 width=5
```

and the program will do the job.

In fact there are even easier ways of altering Program III using the cursor keys (the ones with arrows on them). You'll find a full discussion of these editing techniques, as they are known, in Nigel Peter's excellent articles in the May and June 1983 issues of *The Micro User*.

So we've got a program that we can use to calculate the area of a rectangle. In fact we can use it to figure out the area of any rectangle provided we alter the values of *length* and *width*. The trouble is that it's a bit of a bind having to alter lines 20 and 30 all the time. Program V shows a much more flexible method.

```
10 REM Program V
20 PRINT "Enter length"
30 INPUT length
40 PRINT "Enter width"
50 INPUT width
60 area=length*width
70 REM Look no LET
80 PRINT "The area is ";area
```

When you run this program you'll find that all you have to do is to give it the figures it requests (not forgetting to press Return) and it will give you the area you require. *But how does it work? What does INPUT do? We'll find out next time.*

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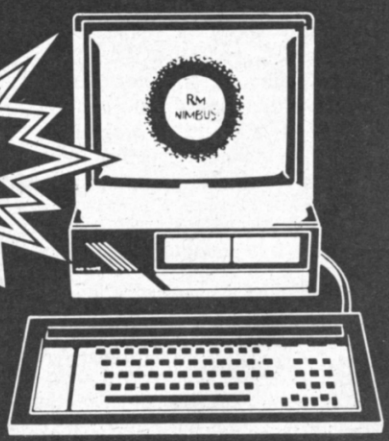

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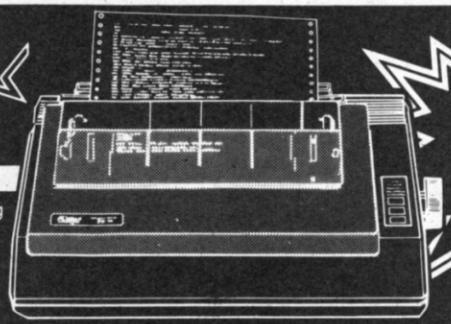

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Stairway to Hell is paved with good graphics

IT all began as a run of the mill journey to the centre of the earth. But unbeknown to Sir Charles Frobisher the path he was following was to become a **Stairway to Hell.** Software Invasion use his story as the basis of this new arcade game.

On paper Stairway to Hell appears similar to every other ladders and levels game. It has multiple screens, tortuous pathways to be negotiated, and lots of baddies.

Yet it scores over the competition by virtue of the quality of each of these aspects.

There are 15 screens, stored as four separate files on disc or tape. As you complete each section you must load the new data before you can continue.

This is fine for disc users but a bit of a chore for the less affluent.

Mode 1 graphics have been used throughout, allowing the programmer to pack as much detail as possible on to each screen.

Having seen every screen I have come to the conclusion that it probably took the programmers longer to create them than it did to write the program. Their use of colour and shading is excellent.

Good graphics are welcome in a game of this nature, but tricky problems to solve are a must.

On each level your task is to make your way to the bottom of the screen, and you quickly realise that there is only one safe route to your goal.

To successfully complete a screen you require agility, timing and cunning. One particularly devious screen involved Sir Charles being sealed off in a small section of the scene.

As he walked along he kept vanishing and reappearing somewhere else in that small area. That particular puzzle took some solving but your intrepid reviewer passed with flying colours.

The ladders and levels section of the games market is congested with many mediocre programs. To succeed a program has to have something special. I believe Stairway to Hell has got what it takes.

Carol Barrow

Superb Citadel

THERE are now so many games available for the BBC Micro that we are becoming rather spoiled for choice. Just occasionally, however, a real beauty comes along, and for me **Citadel,** from Superior Software, is one of these.

Citadel is a role-playing quest game. A particularly evil dictator has made his base in an old castle and built a teleport system there.

It will be used to transport his invasion force of aliens, and your job is to destroy it. To do this you have to find five crystals hidden in various locations in the castle and its surrounding lands.

Sounds very like a traditional adventure – but now for the arcade bit. One room at a time is shown on screen, complete with your hero. You have to guide him round, up ladders, down ropes, leaping over fires by using conventional control keys Z/X for left/right, and so on.

Move out of the room in any direction and the next room flashes up instantly. Useful objects lying around can be picked up, and a lot of extremely nasty creatures have to be avoided or zapped with a spell. You need to be pretty quick with the control keys here.

Citadel is great fun, and you have to play the game to appreciate it. I've spent four weeks playing nothing else, and still only solved half the puzzles. Not only is it very enjoyable, it's also very difficult.

For me, it's almost the perfect game. You need arcade skill to move your hero around the castle safely. You need logic to work out the purpose of the various objects.

The game is well programmed, with excellent graphics and sound. In fact, while loading it even tells you what its name is – yes, a little speech synthesis. Scared the life out of me the first time it did that.

James Bibby

Two for the physics and maths students

LIFT and **Floater** are two further titles in Cambridge Micro Software's 80 track disc educational series. These are aimed directly at the schools market, and in this case at students of physics and maths from CSE to first-year sixth form.

Lift provides a computer model of some aspects of gravitational mechanics by simulating the change in the apparent weight of a mass on a moving spring balance.

The mass, called Mabel, and the spring balance, drawn as kitchen scales, are set in a lift shaft.

With a joystick, the user controls the direction, velocity and acceleration of the scales, pushing Mabel up the shaft, meeting her as she falls, descending with her and so on.

She can leave a trail of dots behind her, the distance between the dots being proportional to her velocity, and these can be seen against a grid dividing the lift shaft into equally-spaced sections.

All in all, this is a fascinating and amusing way of demonstrating Newton's Second Law (force = mass X acceleration) and other principles of motion.

Apart from the use of the joystick, which gives fine control over the movement of the scales, all user-selection is by a friendly system of highlighting.

Floater, built around the same basic design and control structure as Lift but concerned with weightlessness rather than weight, is less amusing than its companion.

The exciting front cover of the manual shows an astronaut in free fall, with Saturn and its moons in the background.

But the cover-designers have here pandered to a fashion for games-style hype, since the program itself displays only a square two-dimensional box and a particle, unimpeded by friction, floating freely within it.

The particle conserves linear momentum, rebounding off the walls with perfect elasticity at an angle proportional to the direction of its approach.

Left to its own devices, it will continue indefinitely in its uniform motion, but, as with Lift, changes in momentum and direction are controlled by a joystick. Again, the particle can

→

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leave a stroboscopic trail of dots behind it, and the box can be marked with a grid for the purposes of measurement.

Displacement, velocity and acceleration are continuously monitored and can be displayed numerically, as graphs, or with vectors (this time Cartesian or polar).

The motion can be frozen at any time.

The educational possibilities of Floater are certainly as wide as those of Lift, but it is likely to have a narrower appeal.

A young pupil can have fun – and learn something into the bargain – just shunting Mabel up and down her lift shaft and watching her weight change.

But apart from drawing pictures with the particle's trailing dots, these programs offer little entertainment value.

Having said that, I should add that to my mind the designer of these packages, who has taken into account educational value, flexibility and entertainment in that order, has got the balance just about right.

Rather, it is the programming which leaves something to be desired.

The fact that the program is unstructured, and that the code is full of GOTOs and GOSUBs is of course something which is transparent to the general user.

But in this case it is also symptomatic of the end result.

For example, when all options are implemented, user-selection in the menus slows down considerably.

The manuals for both Floater and Lift are clear, well-organised, and comprehensive without insulting the intelligence of the user.

Most impressively, each includes a long section for teachers which will be invaluable in the classroom.

A "system" program for adjusting the monitor and setting up a range of common printers for screen dumps is provided with both. And the function keys can be pre-set to recall combination of display options.

At £16.50 each, you can hardly say that they are good value for money, but they should provide teachers with some good material.

Katherine Cranford

Less of a simulation — more of a game

YES Chancellor, by Chalksoft, is a game with a difference, a simulation of the British economy.

And as author Tom Tuite was a senior official in the Inland Revenue you can assume that it may have just that extra hint of authenticity.

Certainly it is all too easy to let inflation get out of hand. You are playing as the Chancellor of the Exchequer and besides directly affecting the economy, your actions affect public opinion.

Be too extreme and the government falls directly, otherwise your actions are judged every five years in a general election.

You'll feel a tremor of apprehension as the results are tabulated on the screen, complete with a form of "swingometer".

The program comes as a suite of files, only available on disc. The initial graphics won't appear if you are using shadow RAM or a second processor, but otherwise there don't seem to be any incompatibilities.

After the graphics display there is the chance to view correspondence between 10 Downing Street and the house next door, the Chancellor's home.

The letters appear as if typed on screen. It is a clever but irritating manner of providing the instructions.

There are four levels of

difficulty, ranging from the easiest, "Testing the water", to the hardest, "Can you walk on water?"

As far as I can tell the unions become more unreasonable in their pay claims as difficulty increases. Certainly their demands become progressively more excessive, and while taking a firm line sometimes pays off, at others (blast that random number function) the cost of provoking a strike is horrendous.

As a part of the package you receive a rather grubby photocopied information booklet and a hints sheet (for teacher). As everything comes in a smart shiny wallet and at a fairly severe price (£17.50) there is no excuse for the untidy documentation. This accurately mirrors the quality of the contents. For a game with pretensions towards the educational market, the hints for teachers are, at the very least, condescending.

In fact, the documentation doesn't do justice to the quality of the software.

The instruction booklet does explain the processes you, as Chancellor, must go through to produce your budget. Then, and after the unions have had their say, your balance sheet is displayed.

More to the point for the politically-minded Chancellor, your party's rating in the opinion polls is also displayed.

If you can survive five years your competence is judged by the public in a general election.

It should be possible to woo the electorate by reflationary policies in the fifth year, just like the real politicians. However my BBC Micro seems to be very rational in its voting.

Yes Chancellor does provide an interesting challenge, as a game.

Had it a facility to retrace a couple of steps in your financial planning to try out "What-if?" factors, it would make it more of a simulation and less of a game.

For those who don't want to be economists it costs too much.

Robert Elwell

Onslaught on the Moon

IF anyone has ever wondered what it would be like to zip across the surface of the moon in a buggy, they can now find out with Kansas City's **Moon Buggy**.

The idea is to get as far as possible over the smoothly scrolling moon landscape using four keys to move left and right, jump and fire.

To make life difficult there are plenty of obstacles in the form of craters and large rocks. There are also rockets that shoot up out of the ground and tanks which fire at you.

Your moon buggy's weapon consists of two lasers, one for blasting objects in your path and one for shooting down the space saucers that make regular sorties above your head.

The background changes with each sector you travel through.

There appear to be 26 sectors each labelled with a letter of the alphabet. The further you venture the more difficult life gets and the fiercer becomes the onslaught from tanks, missiles and rocks.

Later sectors include broken bridges which have to be skipped across, and flashing black and white mines scattered generously across the landscape.

The game is very playable but the novelty soon wore off, probably because it didn't offer anything particularly new.

Andy Mac

White Knight canters home a clear winner

I FIRST tested BBC Soft's **White Knight** some two years ago (see *The Micro User* December 1983). It was then obviously the best available chess program on the BBC Micro, but it had a couple of shortcomings.

The first was that, although it could solve most two mate problems in about two seconds on average – which is very fast – it did not appreciate under-promotion.

The second quibble was that there was no facility to SAVE and RESTORE a game.

The latest White Knight version, Mk 12, is now available on disc and is claimed to be four times as powerful as its predecessor, Mk 11.

Author Michael Bryant has "incorporated additional features, such as saving the state of the game, suggested by reviewers" and now also claims "it has a perfect understanding of all the rules of chess, including stalemate, underpromotion, the 50 move rule and all draws by repetition" and "its estimated rating is 1850+ELO".

Now these are ambitious claims because I have never seen any program with "perfect understanding of ... all draws by repetition" because, thanks to en passant and castling possibilities, the position may look the same but the available moves differ.

However such subtleties do not matter in a real game, but claiming 1850+ does matter and is remarkable since this is about the level of a county player in England and 100 points better than any chess program some 10 years ago.

To test this I gave it the K,R v K ending, which Mk 11 could not do. Mk 12 did it easily in about one minute total play time.

Next the K,B,B v K ending – the program can do this but needs, and had to be told, to take about 10 minutes. It can't do the K,B,N v K ending, but neither can some county players even if they know that they have to drive the Black King into a corner of the Bishop's colour.

The SAVEEDRA position, Figure I, is a good test of anyone or anything's appreciation of repetition of position plus stalemate and underpromotion.

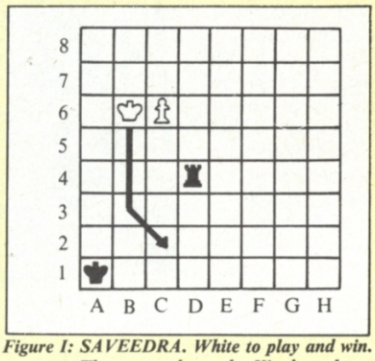


Figure I: SAVEEDRA. White to play and win. The arrow shows the King's path.

White King played this puzzle flawlessly: P-B7 then, because of continuous checks by the Rook plus the need to avoid repetition, it played its King down the board to C2 (which at last prevents the threat of a Rook skewer in C1).

I therefore played the Rook back to its starting position in D4, which threatens stalemate if the pawn is queened.

White Knight correctly underpromoted to a Rook and quickly won the game – it was all very fast and very impressive. I also tried the old Blackburne opening trap, based on the Giouco Piano:

White Knight	*Black*
1. P-K4	P-K4
2. N-KB3	N-QB3
3. B-B4	N-Q5?

which offers a pawn. All chess programs not protected by a book fall for this trap thus:

4. N*P	Q-N4!
5. B*P+	K-K2

but very few appreciate the dangers and recover correctly at this point by giving up the Knight for a King side castling – White Knight does.

The mate solving mode is, if anything, faster than ever and the program comes with a booklet describing literally dozens of other options.

They include stepping forward and backwards through 120 moves, clock and speed of play settings, displaying "Best line" (or not if this is distracting) plus improvements like it "thinks" in your time hence often anticipating your move and replying instantly and so on.

This time it has every option I can think of, and more.

The booklet states that "White Knight is by far the best computer chess program available on the (BBC) computer". Having tested it – it passed every one – and played it – it's certainly above 1750 – I can only say that this claim is too modest.

White Knight is probably the best chess program on any micro. Highly recommended.

Alex Bell

Time can drag

I HAVE seen several excellent programs dealing with aspects of time, so it was with interest that I loaded **Tell the Time** from Duckworth Educational Computing.

The tape consists of three separate but linked and complementary programs, each dealing with an aspect of time as it relates to both analogue and digital display.

Together they would certainly cover most aspects of this work, with each having a variety of options concerning display, difficulty and purpose.

The first section, Tell the Time, has the child either setting the clock to the words supplied, or supplying the answer for the displayed time.

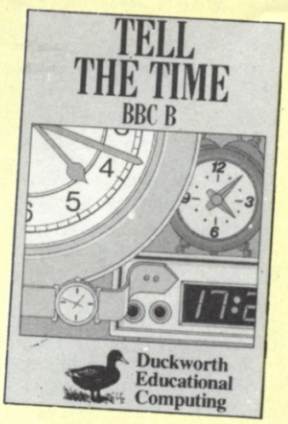
Clockset displays a clock, digital or traditional, and allows the child to move the hours or minutes by pressing H or M.

Pressing T will reveal in words the current time displayed.

24 Hour Time Translator is the rather unwieldy name given to the final program, dealing specifically with the links between 12 and 24 hour times.

Again there is a wide range of options to be selected, thus increasing the program's potential. This seemed to be the most educationally sound of the three, containing more helpful information for the children when problems arose.

The first and third program share an annoying aspect – after every single question you return to the score screen, with the option to have another question.



Duckworth call this constant monitoring, but in a busy classroom it becomes a constant nuisance when children require an explanation of its function.

This is only a small niggle, but it spoils a competent program.

Phil Tayler

Phantom flies fine

IT quickly becomes apparent, when playing **Phantom Combat,** Dr Soft's latest flight simulator, why it cost the Royal Air Force more than £2,000,000 to train each of its fighter pilots.

At least, in this simulation of the F4 Phantom, a crash in the practice mode isn't fatal. You can hit the ground at over 700 knots and bounce off, although the noise of scraping metal suggests that repairs will be necessary.

Landing isn't very easy. It is possible, occasionally, after numerous attempts, and so it's very realistic. However in the alternative mode for this simulator, Operations, there is no bouncing along the ground. Crash and that is it – you have only the one life to lose.

More to the point, in the practice mode you can either fly in formation with, or practice shooting down, another aeroplane.

When operational, the other plane tries, with considerable success, to shoot you down.

You do have a display to tell you where it is, which seems to be mostly behind you – not a good place for an enemy fighter to get, which is confirmed when the screen shudders.

Gunfire is hitting you, and a damage report at the bottom of the display tells you just how bad things are.

Fortunately this fighter has an ejection seat – hit the Escape key. You can save some of your score and go on.

Crash the Phantom and the game restarts. Or at least that is what the instructions tell you.

My micro, with Acorn's DNFS 1.2, went into Mode 3, the disc drives started spinning and the screen locked up. Crash and you'll really crash!

Response to the controls is fabulous. If you have double joysticks, one can be made to act as the throttle, giving increased realism. The cockpit view moves smoothly, but is alas constructed from very simple wire graphics, with almost no ground detail.

The instrumentation is adequate, but a pilot would really need extra pitch information on the artificial horizon.

If you like flying, this game is for you. The simulation is responsive and great fun. In fact, after Aviator, it is the best flight simulation I've seen on the BBC Micro.

Robert Elwell

It's the drive-in database

SOFTWARE developers have long been juggling with ideas about computerised diagnosis.

The logistics are simple enough. Almost everything depends on the quality of the knowledge base, and therefore on the experts who have pooled their experience to produce it.

Car Cure from Simtron applies this system to the world of motor vehicles with, as far as I can make out as an interested but inexpert car mechanic, a pretty impressive knowledge base.

It covers 300 symptoms and 900 faults concerned with every aspect of vehicle maintenance, from starting the engine to body vibration.

And it comes up with sensible answers.

You enter the database either by a Symptoms "gate" or, if you have a good idea what the offending part may be, a Parts "gate". From then on, you proceed down the text-only tree using the cursor keys, making a choice from a menu of items at each node.

When the program has enough information to explain the fault it suggests a course of action, together with an associated level of difficulty.

Built-in Help screens can be called up at any time, but they are hardly necessary since there are few commands to remember.

And all you need, in any case, is in the manual, which contains diagrams of engine parts, worked examples, and lots of safety advice on not following the program slavishly, especially when dealing with things like brakes and steering.

Car Cure is available in two versions, one for private use, the other for colleges.

The college version can be upgraded to run on Econet, and also includes two extra functions, an adjustable time delay, intended to allow group discussion before the program moves to the next screen, and a screen dump. Why this print option should not be there on the private use version, beats me.

According to Simtron the package is now being used in more than 100 colleges by motor vehicle students, and I can certainly see its potential as a teaching aid.

But I have my doubts about its real usefulness for do-it-yourselfers. Those who know about cars will hardly need it, and those who don't are not likely to begin tinkering simply as a result of having used it.

I hope I am wrong. Apart from the fact that the program hangs if a screen dump is attempted with no printer attached – I wish developers would knock that one on the head, it's easy – the program deserves to succeed.

Gabriel Jacobs

Locked up too tight?

SOME months ago I reviewed the Read-Right-Away series from Highlight and was struck, as were the children in my class, by the super graphics.

Now Highlight has released a new series of language programs on cassette and disc.

Adventurous English introduces a cute little character called Ben who, laden down with a large knapsack, goes hiking off through a variety of locations.

These include a factory, a camp site, a house, woods and at each location the child is asked to enter a suitable adverb for his journey.

Thus he might go *over* a bridge, or *through* the hospital. The movement of the little hiker is smooth, perhaps aided by a curious tendency that Ben has to move three legs at once.

Once the child has had the necessary reinforcement at this first level, he may continue on to the far more interesting second level, where the locations can be visited in any order.

At certain places he comes across items which might be valuable elsewhere, such as a tent pole or a mask.

These come into their own at certain points, for danger now lurks to be overcome by the earlier acquisition of the necessary object.

For example, a mask is used in the plague-ridden hospital and the dog frightens away the troll.

The objects appear to be always at the same points, but at the age range with which this program is concerned – 7 to 12 years – this is valuable as it can develop strategy and planning.

Again Highlight has produced a top quality program, and one which will prove to be very useful in the classroom.

It is a pity that the protection is so tight that few teachers will be capable of altering the words used so as to make the program even more valuable.

Phil Tayler

WE OFFERED THEM A CHALLENGER THEY GAVE US BACK A CHAMPION

After testing the new 3 in 1 Challenger disc drive system from Opus Supplies, Britain's three leading BBC micro magazines were clearly impressed. After all Challenger is the fastest disc link-up ever with no complicated interface connections, soldering or track cutting. No wonder this remarkable plug-in disc drive, double-density disc interface and super fast 256K RAM disc combination is currently taking the market by storm.

A&B COMPUTING

THE VERDICT

"Opus have got a winner on their hands. If you are looking for a disc upgrade you can't go far wrong by buying a Challenger, even if you already have a single drive this would certainly be a sensible upgrade path. This certainly gets my vote as best buy of the year."

A & B COMPUTING – JANUARY 1986

RAM DISC PERFORMANCE

"Here is the pièce de résistance of the whole system – a 256 K RAM disc. I honestly don't know how Opus can do it for the price.

Using the RAM disc is a real dream with disc based applications. Getting back to the actual performance of Spellcheck II, with the dictionary disc set up in the RAM disc, the result is amazing. When in automatic checking mode the text scrolls past so fast it is difficult to read. To put some figures on the improvement in speed, I checked a document just over 21 K long, which took 5 minutes 56 seconds on floppy and only 1 minute 7 seconds using the RAM disc."

A & B COMPUTING

ACORN USER

THE VERDICT

"At £249.95 inclusive you get the RAM disc, double-sided 40/80 track drive, Opus DDOS plus manuals and leads. Overall very good value for money, particularly if you are looking for a disc upgrade from scratch."

ACORN USER – FEBRUARY 1986

RAM DISC PERFORMANCE

"The big deal comes in the speed. Being a purely electronic device, actions such as reading and writing are performed in fractions of the time a mechanically engineered disc drive takes.

To prove the point, I ran three programs on the RAM disc and the same three on the standard Opus drive with the following results (timings in seconds):

	RAM DISC	NORMAL
1 Save 32 K memory	0.34	13.69
2 BPUT 1 to 1000	1.14	4.71
3 PRINT/1000 strings	4.64	10.17

You don't need me to point out the huge speed increases."

ACORN USER

THE MICRO USER

THE VERDICT

"For the serious user Challenger could make file handling far easier and a good sight faster to use than a standard DFS as well as bringing a permanent end to 'is it 40 or 80 track, single or double density?' problems. In addition all the workspace used by a standard DFS is reclaimed and made available to the user by Challenger."

THE MICRO USER – FEBRUARY 1986

RAM DISC PERFORMANCE

"Of course it's not just a versatile disc drive, Opus also provides you with 256 K of RAM to play with. This RAM thinks it is a disc and the DDOS treats it as drive 4. If you have the 512 K version you get a drive 5 too. The RAM disc allocates sectors to files so that errors such as 'can't extend' are eliminated. In other words, it is a simple matter to use the RAM disc for most of your random access files then copy completed files from the RAM disc to a floppy disc."

THE MICRO USER

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– Dave Futcher, Educational Computing

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A QUICK TOUR ROUND THE DEPARTMENTS

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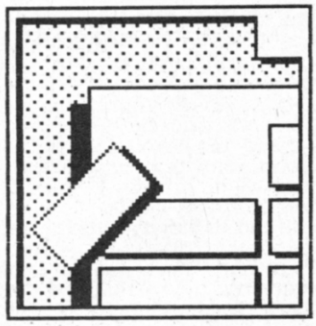
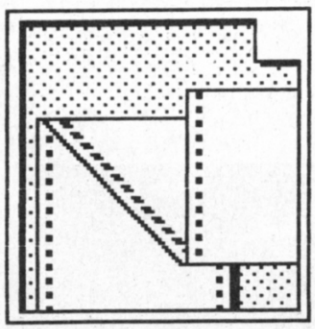
STUDIO
Where you modify existing art from the Library or your own collection, or create your own. All the graphics in the Library were created here.

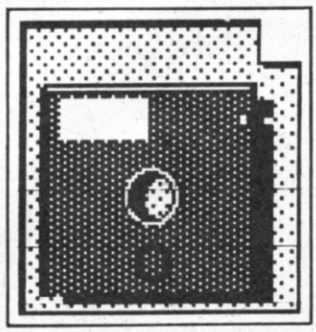
COPYDESK
Input your text here, using either the program's word processor or existing View or Wordwise files, and watch it wrap automatically round your graphics. Use different fonts, too.



PAGE MAKE-UP
Define the format for your page and construct it from the catalogue of panels you've built up. Some panels are provided ready-made for you to experiment with.



PREVIEW AND PRINT
Preview a reduced representation of your completed page on screen, approve it, and send it to your printer using one of the built-in printer-drivers – you can write your own, too.



ADMINISTRATION
Set up the program to suit your system configuration, format disks, integrate graphics from most Mode 4 programs, and further manipulate Fleet Street Editor files.

THE FIRST EDITION

Publication: January 23rd 1986

The minimum equipment you need to become a FLEET STREET EDITOR is:

- ✻ BBC Model B with disk interface
- ✻ 40 track single-sided disk drive
- ✻ Dot matrix printer capable of 640 dot bit image mode and true descenders
- ✻ Monochrome monitor or TV

You can configure the program to any type of drive combination via the Administration department.

FLEET STREET EDITOR is supplied on two disks – one containing the program and one containing the graphics library. These are formulated in different ways for different drive configurations, so take care when ordering or buying FLEET STREET EDITOR that it matches your current system. Upgrades are available.

The registration card supplied in the back of the manual, when completed and returned to us, will ensure you receive details of new software designed to enhance your FLEET STREET EDITOR.

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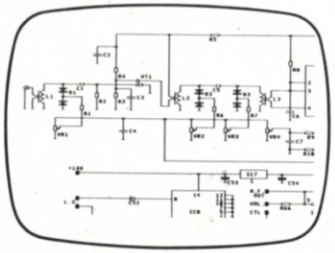
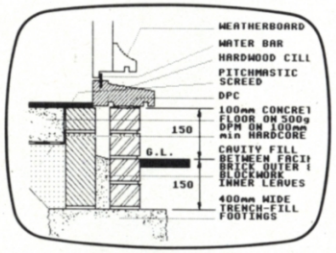


ELECTRONIC CIRCUIT DESIGN

USING GRAFPAD FOR TRACING



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Database proudly presents...

When it was launched in October, 1984, Mini Office was acclaimed as the most innovative software of the decade, creating new standards in serious programming – and at a price everyone could afford.

Since then it has become far and away one of the best-selling packages ever created for the BBC Micro, frequently displacing games from their position in the Top Ten. And, unlike most software releases, it is still as much in demand now as it was 15 months ago.

Which is why there has been so much speculation throughout the industry about what the much-rumoured Mini Office II would be like. After all, how do you beat a best-seller?

The answer is – by making it even better! And the new Mini Office II is certainly that . . . in every respect.

While still retaining upward compatibility with the original Mini Office, it is packed with a host of new features that have been made possible by the tremendous strides made in programming techniques in the last 12 months.

The result is the most comprehensive suite of business programs ever produced for the BBC Micro – and still the best value ever.

And it comes with a no-nonsense easy-to-follow guide to business computing that will take you step by step through all the many features, showing you how to use their huge potential to the full.

Some of the features of the new Mini Office II

With the word processor you can . . .

★ Select most features by menu or embedded commands. ★ Transfer records from database for personalised circulars. ★ Choose from three methods of display: 20 column (double size characters), 40 column, 80 column (20 and 80 columns only on 'B' Plus and 6502 Second Processor). ★ Centre, indent, tab, justify and merge text. ★ Insert, copy, move or delete blocks of text. ★ Select two editing modes: insert or overwrite. ★ Search and replace globally or selectively. ☆ Check typing speed in words per minute. ☆ See on-screen real-time clock, plus word and character count.

With the database you can . . .

★ Select five field types (Alpha, Decimal, Date, Integer, Formula). ★ Perform all arithmetic functions. ★ Search over multiple fields. ★ Mark individual records. ★ Use flexible printout routine. ★ Pass records to the word processor. ☆ Carry out powerful multi-field record sorting.

With the spreadsheet you can . . .

★ Total rows and columns, with easy selection of criteria. ★ Copy formulae either absolutely or relatively. ★ Print out all or part of the spreadsheet. ★ Move directly to a specific location. ★ Select movement of cursor. ☆ Recalculate automatically or manually.

With the label printer you can . . .

★ Design any style of label with the versatile editor. ★ Select label size and sheet format. ★ Read directly from database files.

With the graphics pack you can . . .

★ Enter data directly or take from spreadsheet. ★ Use icon type menus. ☆ Choose pie chart, bar chart or line graph. ★ Display up to three line graphs simultaneously. ★ Display up to three bar charts side by side or stacked. ★ Choose bar charts in either 2D or 3D. ★ Draw compacted or emphasised pie charts. ★ Define your own style of shading. ★ Dump graphs directly to Epson or Seikosha compatible printer.

With the comms pack you can . . .

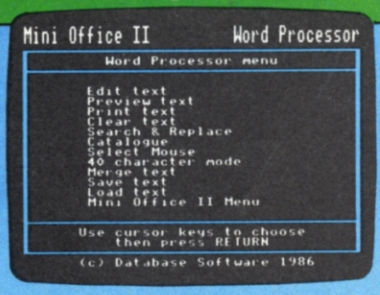
★ Access MicroLink or Telecom Gold with only two key presses. ★ Select protocols as required. ★ Change modes while on-line. ★ Store text directly to memory or disc. ★ Use one-key 'Stop' command.

With all the modules you can . . .

★ Use the AMX Mouse. ★ Choose foreground and background colour in most modes. ★ Make more efficient use of memory and faster response time thanks to machine code content. ★ Take advantage of the extra memory of the BBC B Plus and 6502 Second Processor.

★ **Features that were not in the original Mini Office.**

It's a word processor . . .



It's a database . . .

It's a spreadsheet . . .

It's MINI OFFICE II on the BBC Micro! All 6 modules

Software

ORDER FORM ON PAGE 175

It's a graphics pack . . .

Mini Office II — Graphics

Graphics menu

Bar chart
Line graph
Pie chart
Load data
Save data
Edit data
Clear data
Select Mouse
Review data
Catalogue
Mini Office II Menu

Use cursor keys to choose
then press RETURN

(c) Database Software 1986

It's a comms pack . . .

Mini Office II — Communications

Communications menu

Microlink/I.Gold (1200/75)
MicroLink/T.Gold (300/300)
MicroLink/I.Gold (1200/1200)
Customised protocols
Select Mouse
Mini Office II Menu

Use cursor keys to choose
then press RETURN

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It's a label printer . . .

Mini Office II — Label Printer

Label Printer menu

Load file
Append file
Catalogue
Edit format
Load format
Save format
Print labels
Storage media.....Disc
Select Mouse
Mini Office II Menu

Use cursor keys to choose
then press RETURN

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JO STORK begins a new series on the BBC Micro's place in business

Finding a safe path through the commercial micro minefield

READERS will be well aware of the commercial carnage that has occurred over the last few years among micro suppliers.

Some computers never even left the drawing board, or on reaching the market place became bankrupt stock after only a few months. Others are still widely available at greatly reduced prices but their manufacturers are still with us by virtue of a succession of well publicised buy-outs, bale-outs and sundry boardroom back-stabbings.

The list of unsuccessful entrants into micro manufacturing is not limited to unknowns, but includes extremely profitable groups specialising in domestic electronics.

Much less well documented is the vastly greater number of failures among software suppliers. Software production generally lags behind that of hardware by between four to nine months, hence many micros either never had any software at all or had a limited range before the programmers painfully realised that the only wise choice was to cut their losses.

The dropouts

Still more software producers decided to wait until a model had a reasonable market share before trying to cash in. Unfortunately this delay, when added to the time factor of creating a suitable product and setting up a distribution operation, was such that by the time the program was eventually released it made no commercial impact at all.

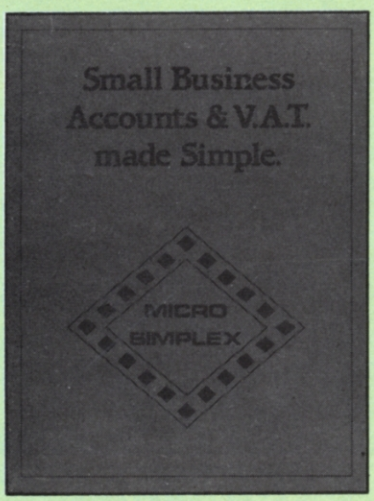
I make no apology if all this seems a bleak start to my regular column. That was precisely the intention, and just in case the point has not come across forcefully enough, here is another fact. And it should be remembered the next time you feel tempted to sign a cheque for any computer-related product.

This fact is that a recent independent survey has shown that of all the micro products vendors who were in business five years ago less than 20 per cent are still trading. Most of these dropouts were software suppliers.

Now that we fully understand why caution must be my by-word I can turn to the more positive topics which will feature in this column. Having shown you the minefield I can begin to lead you through it.

Fewer options

Remember that selecting the computer itself is less of a problem for an entrepreneur than choosing its software. This is partly because the range of options is much smaller, but is also due to the nature of the beast. After all, until it has any software the micro is no more than a very expensive desk ornament. Whether it becomes a worthwhile investment is ultimately the responsibility of the software.



Selecting business software therefore requires all your critical and analytical faculties. If you choose a game which quickly bores or disappoints you, then all you have lost is a few pounds. Giving it away after a couple of weeks is relatively unimportant. Choosing the wrong commercial software can prove a major financial disaster.

You should adopt the principle that unless your organisation is enjoying unusual rates of growth, any software will be used for at least three years. It now becomes obvious why the source of supply becomes critical. This life expectancy is needed to justify the conversion costs, familiarisation time and so on.

Having weeded out the vendor who is unlikely to be around to help you when you most need him, you can turn to the variety of tasks which computers are put to in business.

Guidelines

The multiplicity of offerings to tackle these tasks means that I cannot even begin to scratch the surface of software which might catch your eye. I will therefore use my reviews to illustrate principles by which any commercial software must be judged rather than just give a bald list of file sizes, menu options and so on.

With the ground rules now explained, let us look at Small Business Accounts & VAT Made Simple from Micro Simplex and see how it fares.

If my normal hourly rate for consultancy services was the same as I will receive for this review, my family would have entered the poor house years ago.

This does not imply a criticism of either the editor or of this package, but is a simple statement expressing the length of time it takes to review a sophisticated business package even when the concepts on which it is founded are thoroughly understood.

This same sophistication leads me to my first concern about this package. It totally meets the objective of providing a comprehensive invoicing, book-keeping and VAT system for the small businessman. However, because of the wide range of facilities it contains, I have severe doubts as to the ability of many of its targeted users to make the most of these features.

My estimate is that an average organisation will require a minimum of 25 man/hours to convert from a manual system to this one, and since this will be frequently required of one person my concern is whether this time will be committed to the change-over.

Simple as this package is, few first time users will expect such a hefty time investment. This estimate of 25 hours is made up of:

- Reading the 100+ pages in the extremely good manual, at least twice, before even sitting down at the keyboard. **(3 hours)**
- Preparing blank discs, setting up printer options, organising back-up procedures and obtaining the registration code (anti-piracy code), without which the program will run for only one week. **(3 hours)**
- Deciding under which of up to 99 headings the receipts will be analysed – a DIY shop may use tools, timber, plumbing and so on. This selection must be thorough and complete, since you will have to live with this choice for a long time. **(5 hours)**
- Deciding under which of up to 10 headings for purchases (items bought for resale or for re-working into finished products) will be analysed – a cafe may use vegetables, meats, drink and so on. Again this must be thorough and complete. **(2 hours)**
- Deciding under which of up to 40 headings for expenses, 23 of which are pre-created in the package, will be analysed, such as wages, vehicles, interest, and VAT payments. Of these three sets of headings this must be the most thorough and complete, since control of costs is as important to profit as the increase in sales revenue. **(2 hours)**
- Practising the package's operations and checking on the format of the reports. **(4 hours)**
- Planning and practice for invoicing routines. A 40 track disc can store details of approximately 150 customers and 550 invoices before another disc is required. **(3 hours)**
- Only once these 22 hours have been spent can one even consider transferring the current manual data onto the system prior to "going live". The time this will take is utterly dependant upon the state of the books at the time, but merely finding this data and apportioning it against the headings chosen above let alone entering it into the system, will require several hours.

This is a fairly forebidding list, and it is invariably due to the lack of this preparation that most people are forced to make do with less than satisfactory systems. If you are prepared to invest this time and effort this system will provide excellent service.

Simplicity

I can therefore strongly recommend it on several counts.

Firstly because it is simple to use and does not add further layers of complexity to the task of keeping the books. Since it is primarily menu driven with clear, logical question and response sequences for the transaction details, anyone who has ever entered a three-line Basic program will have no problems with its operation.

Secondly a copious series of reports are available:

The fundamental, such as profit and loss, VAT return preparation.

The detailed, such as a listing of any single heading's transaction, cheque reconciliation.

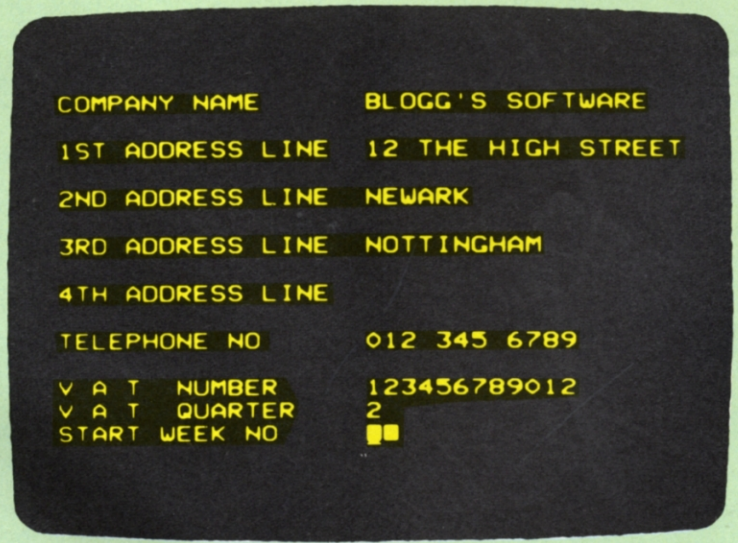
The helpful, such as audit trails.

Providing you make regular and frequent entry of the transactions there is no excuse for you not to have an extremely clear knowledge of the financial state of your organisation at all times.

Thirdly there is a User Club with a telephone help desk, program enhancement service and free update facilities if the legislation – for example the rate of income tax changes. Even at £50 a year this can prove invaluable.

I would say this is a thoroughly professional approach to an age old problem. Many small businesses are equally professional, and they will do well to place it at the top of any short list of book-keeping packages they are drawing up.

Any potential users must however truthfully ask themselves: "Will I do the preparatory spadework?" If they have any doubts at all, they need to develop a far more organised approach to their commercial thinking before entertaining any idea of using computerised systems.



A sample screen from the generator program

MPSS, powerful package aimed at institutions

MPSS, from Management Data Systems is a specialised database for the BBC Micro which allows large amounts of data to be analysed quickly and efficiently. Grandly christened in full the Monitoring Package for Social Systems, the package can nevertheless be said to be just that, and more.

It grew out of the need for fast information feedback in the social services. In certain cases, previous methods of data analysis, via a centralised computer system and a liberal helping of red tape were taking two years to provide results. A number of local authorities are now using MPSS on the BBC Micro instead.

A ready-tailored version is available for the social services, but the standard package can be put to a range of uses, lending itself particularly to applications where analysis of data is the principal requirement. Unlike its powerful big brother, a mainframe giant called SPSS developed for large research projects in the social sciences, MPSS does not incorporate any statistical procedures as such. However it will provide the raw analyses to which statistical formulae can later be applied – and without the delays.

Cross-tabulation

An obvious application in the field of education, say, would be exam records. These could be analysed for cross-tabulation of degree results with A level results, though the coming into force of the Data Protection Act has to be borne in mind. MPSS will probably be of most use in areas which are exempt from the Act (such as medical records), those of a non-personal nature (wildlife data), and those where free access to personal details can be allowed.

A dongle protects the software from being copied, but unfortunately not the data from being tampered with, if someone knew how.

Though it comes on disc rather than on a ROM, operation and style are similar to the better kind of database package for the BBC Micro. The main menu allows you to set up a new file structure, add and delete data, generate reports, compact a file, and so on. Figure I contains a summary of the features.

One of its strengths is its Search facility. This is fast, and particularly so where you make use of a look-up table field – possible wherever data is known in advance to fall within a pre-defined range, for example a pupil age field of 11 to 18.

Boolean-type data such as male/female would also be appropriate.

The look-up field allows cross-tabulations to be performed on all or selected records. Tabulations can be produced using up to three look-up fields, and any single look-up field can produce a frequency table.

Instring and wild card searches are allowed – or, as the manual has it, "wild character searches", conjuring up images of escaped lunatics, and maybe reflecting the social services origins of the package!

Any number of fields can be contained in a search operation, so long as the total number of characters in the whole instruction does not exceed a maximum of 250.

MPSS is capable of handling datafiles as large as your disc drives permit, with the four sides of a dual double-drive system being able to be treated as one logical file for the purposes of analysis. In such a case you could have an 800k

Basics	
Maximum no. of files open	4.
Maximum fields per record	250.
Maximum characters per field	250.
Field types	String, numeric, date, look-up.
Search options	Instring, wild cards.
Number of search fields	Limited only by maximum search string length.
Maximum search string length	250 characters.
Relational operators (=, >, etc)	All.
Logical operators (AND/OR)	AND only.
Sort facilities	None.
User-definable printer output	Yes.
User-definable screen masks	Yes, but not for data entry.
Modifiable file structure	Yes.
Spooled data output	Only as a mail merge facility.

Special features

Up to five different sub-structures possible within record structure. Look-up table field gives tabulations, frequency table, percentages. Command file facility for repetitive operations.

Figure I: MPSS features at a glance

file of 14 thousand 50-character records.

Most unusual is the facility for creating sub-records, attached as off-shoots to the main record – rather in the style of the 'transaction' files of Compsoft's Delta running under CP/M and MS-DOS. In MPSS these are called front sheet and auxiliary records. A front sheet can have up to four auxiliaries, each with a distinct structure, if required. The auxiliaries can in turn hold up to 10 levels of records. This makes for exceptional flexibility in data management.

The flexibility is carried over into screen output. Text templates for displaying records can be created with a word processor such as Wordwise or View. Any combination of fields from across the whole of the record, including its sub-structures, can be inserted into the template. By the same process, a rudimentary mail merge output can be achieved.

Specialised

There is a powerful option for creating batch-executable files – that is, a set of commands issued in one go for repeatedly required operations, say weekly or monthly reports.

MPSS has no sort facilities – records are simply stored in alphabetical order. However, the package was not designed as a standard database, and for its intended purposes of analysis, a selection of sorts is not crucial.

An "idiot user guide" and reference manual would certainly have been handy for a package of the complexity of MPSS, and an index I would have thought essential. Unfortunately, the 151 page manual does not cater for a "normal" user. It is also quite unstructured, and though it contains worked examples, it is hard to distinguish text from example, and to fathom out how the worked examples work.

MPSS has not been specifically designed for business, or, for that matter, for pleasure. It is a specialised database, with some very powerful features. Some people may find the price off-putting – £100 for the standard package – but it is aimed at institutions rather than individuals. For the right kind of application, it can be highly recommended. **Katherine Cranford**

Useful adjunct to Inter Sheet

INTER-CHART is Computer Concepts' second step on the road towards a sophisticated set of integrated ROM-based packages. The first of the series, Inter-Sheet, has already established itself as a rival to the best spreadsheets available for the BBC Micro, and its communications facilities are second to none – see the November 1985 issue of *The Micro User*.

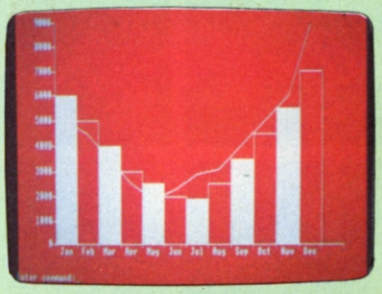
The Inter-Chart package allows line graphs, bar graphs and pie charts to be produced quickly and easily from data taken from a variety of sources. So, for example, the package can use any data created with a word processor, as long as you format the text in the right way.

It can also be used interactively – data can either be entered directly, or pulled in from other sources and modified, using the built-in editor. Finally you can, of course, import directly from Inter-Chart's sibling package, Inter-Sheet, if you have this.

To view your graphs you select an option from the main menu, from which, using a function key, you can switch between the three types of display – pie charts, bar graphs or detailed line graphs. In this mode numerous parameters can be specified, including

ones for prettying up the displays, such as titles, number format, and a percentage toggle for use with the pie chart.

There are two types of display for editing the graphs. The first is for labelled graphs – say figures given over a period of a year, where the months of the year are the labels. Here a bar graph type of display is used. The second type, scaled graphs, is for data consisting of x, y values and uses a simplified line



graph.

Colours can be changed from the default black and white, and bar graphs can be set up to display striped varieties. Colour parameters, along with graph type, mode, and other bits-and-pieces such as the titles, are saved along with the graph data.

You can have up to 16 sets of graph data in memory at any one time. This is particularly useful for comparisons, since line graphs and bar graphs can be overlaid. Any differences in scaling are automatically adjusted to fit.

Modes 0, 1, 2, 4 and 5 can all be used, within the usual memory constraints. Inter-Chart will in any case select the best mode for the amount of data being handled.

For users of the BBC B+, or those with shadow RAM (compatible boards include the Watford 32k and the Aries B20) the RAM can be used to take care of the graphics screen, leaving the standard memory free for larger amounts of data.

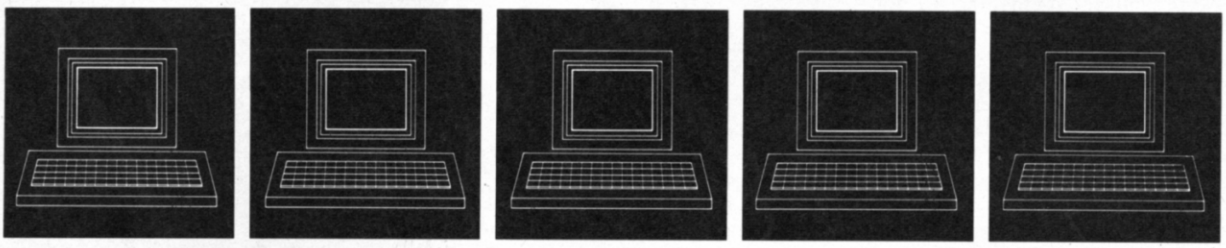
For printing out, a screen dump is included, which works with Epson or compatible printers. Generalised instructions, or at any rate hints, are given for users of other printers.

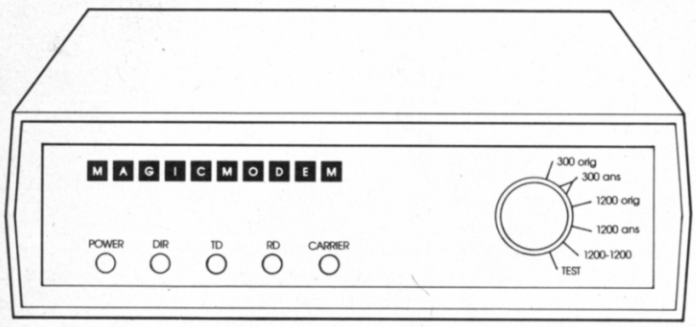
The documentation is sensible and clear, consisting of a spiral-bound manual divided into two parts, a practical bit with worked examples and illustrations and a reference section. There is also a quick reference card and a function key strip.

On the whole Inter-Chart is well designed and easy to use. It will be useful in its own right, but will be a particularly convenient adjunct for those who have Inter-Sheet.

Katherine Cranford

MAGIC





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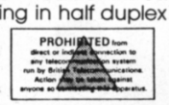

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Making bad tracks

Final part of the series by KEVIN EDWARDS on the 8271 floppy disc controller

IN last month's article I described the 8271's formatting process, error meanings and part of its command set. Now we'll complete the command list and, hopefully, give you enough confidence to handle OSWORD &7F on your own.

First of all we'll look at some of the 8271's more unusual features.

A disc can be programmed with what are known as "bad tracks". Two bad track registers exist for each disc surface and specify tracks which are to be totally ignored by the 8271.

For instance, if you indicate that tracks 1 and 2 are "bad" the 8271 will move to track 3 when a command involving track 1 is executed.

As far as the 8271 is concerned physical track 3 is now track 1, physical track 4 is track 2 and so on.

If you ever use bad tracks you must ensure that the track number in the sector ID fields for all tracks after the bad ones correspond to their logical track position. Remember, the bad tracks don't exist in the eyes of the 8271, so the IDs must be offset correctly.

Figure I lists the first six physical and logical track numbers if tracks 1 and 2 are bad.

Physical track	Logical track
0	0
1	bad
2	bad
3	1
4	2
5	3

Figure I – The good and bad tracks

When bad tracks are used their track IDs should be set to &FF (255). This is done when the disc is being formatted.

The DFS sets the bad track registers to 255, indicating that no bad tracks exist. Track 0 should not be declared as bad because this confuses the 8271.

While on the subject, here's a list of the command and parameter bytes required to program the bad track registers:

LOAD BAD TRACKS

No data transfer.

Command	&75
Parameters (n)	4
Param 1 – Surface select	
surface 0 or	&10
surface 1	&18
Param 2 – Bad track 0	&—
Param 3 – Bad track 1	&—
Param 4 – Current track	&—

Since the current track, parameter 4, may be unknown, the write special register command should be used to change the bad tracks as well.

Whenever a sector cannot be located on the specified track the FDC will check the next two tracks for it. If the sector is found on one of the following tracks it is accessed as if nothing unusual has happened. Whether this is a good or bad thing is another question.

Last month I briefly mentioned deleted data. So here's a bit more about this unusual data type. The data address mark (DAM) just before the sector data field is changed by the 8271 when either normal or deleted data sectors are written. The DAM is normally &FB, but when deleted data is saved it is changed to &F8.

Once a deleted data sector has been saved only a read deleted data command can be used to transfer the sector data to memory. You see the DAM is examined each time a sector is read from the disc. Executing a normal sector read command will fail to access the sector if the DAM is &F8.

Deleted data sectors are very useful for hiding information from prying eyes. Note that bit 5 of the result byte will be set when deleted data is read.

Now to complete the 8271 command set which I started in last month's article.

The read ID field command extracts a defined number of sector IDs from the selected track and transfers them to memory.

READ ID FIELDS

Data transfer does occur.

Command	&5B
Parameters (n)	3
Param 1 – Track address	&—
Param 2 – Must be 0	&00
Param 3 – Number of ID fields to be read	&—

Each sector ID consists of four bytes – C, H, R and N, where C is the track address, H the head address, R the sector number and N the sector size. The IDs are read in exactly the same

```
 10 REM ID Field reader
 20 REM By Kevin Edwards
 30 REM
 40 MODE7:VDU23;8202;0;0;0;
 50 maxtracks%=40
 60 osword%=&FFF1
 70 IDbuffer%=&FFFF0C20
 80 oswordblock%=&FFFF0C00
 90 REM ************************
100 REM Seek read/write head to
110 REM track 0.
120 REM ************************
130 ?oswordblock%=0
140 !(oswordblock%+1)=&FFFFFFFF
150 oswordblock%?5=1
160 oswordblock%?6=&69
170 oswordblock%?7=0
180 A%=&7F
190 X%=oswordblock% MOD 256
200 Y%=oswordblock% DIV 256
210 CALLosword%
220 IF oswordblock%?8<>0 THEN PRINT
"Disc error ";~oswordblock%?8:END
230 REM ************************
240 REM Now set up the OSWORD block
250 REM for read ID fields
```

Program I

order as they were when the track was originally formatted.

If you read more IDs than there are sectors the ID bytes will repeat from the first one – you'll need to check for this if you are trying to calculate the number of sectors on a track.

An attempt to read sector IDs from an unformatted track will result in the error *sector not found* – error &18. This is because there are no sectors to read IDs from.

The read sector ID command is very useful for finding out the contents of a track. It can be used to calculate the number and size of all the sectors present. Program I demonstrates this by reading the ID fields of any disc.

The read and write special register commands allow the 8271's internal registers to be accessed. The 8271 has 12 different internal registers which are listed in Figure II.

READ SPECIAL REGISTERS

No data transfer.

Command	&3D
Parameters (n)	1
Param 1 – Register address (see Figure II)	&—

WRITE SPECIAL REGISTERS

No data transferred.

Command	&3A
Parameters (n)	2
Param 1 – Register address (see Figure II)	&—
Param 2 – New value	&—

The read special register command returns the current value of the selected register in the result byte of the OSWORD block. Program II shows the commands used to read surface 0's current track register.

The write special register command allows the internal registers to be altered. The second parameter in the control block is the byte written to the selected register. Program III writes to surface 0's bad track register.

Registers in Figure II with an asterisk next to them are not available on the BBC Micro but have been included for completeness.

The special registers are quite complicated so we'll look at each one briefly. The current track registers (&12,&1A) contain the track address of the read/write head of the selected drive. Writing different numbers to these registers can fool the 8271 into thinking it's at a different track address.

For example, if the read/write head is at track 4, and 6 is written to the current

Description	Register Address	
Scan sector number	&06	*
Scan MSB of count	&14	*
Scan LSB of count	&13	*
Surface 0 current track	&12	
Surface 1 current track	&1A	
Mode register	&17	
Drive control output port	&23	
Drive control input port	&22	
Surface 0 bad track 1	&10	
Surface 0 bad track 2	&11	
Surface 1 bad track 1	&18	
Surface 1 bad track 2	&19	

Figure II – The special registers

```
260 REM ***************************
270 REM Select Drive 0
280 ?oswordblock%=0
290 REM buffer address =IDbuffer%
300 !(oswordblock%+1)=IDbuffer%
310 REM Number of additional
320 REM parameters needed for the
330 REM ID read command.
340 oswordblock%?5=3
350 REM ID Read command byte
360 oswordblock%?6=&5B
370 REM The track number. This is
380 REM incremented after each
390 REM track's IDs are read.
400 oswordblock%?7=0
410 REM Parameter 2 is always 0
420 oswordblock%?8=0
430 REM Number of ID fields
440 REM to be read
450 oswordblock%?9=18
460 REM ***************************
470 REM Now begin reading the IDs
480 REM ***************************
490 FOR track%=0 TO maxtracks%-1
500 REM Change track number in the
510 REM OSWORD block.
520 oswordblock%?7=track%
530 CLS
540 REM Execute the OSWORD.
550 CALLosword%
560 REM Test for error.
570 PRINT"Track ";track%'
580 IF oswordblock%?10<>0 THEN PRIN
T''"Disc error ";~oswordblock%?10:GOT
O 660
590 PRINT" Track(C) Header(H) Secto
r(R) Size(N)"
600 FOR ids=0 TO (17*4) STEP 4
610 FOR ids2=0 TO 3
620 PRINT;SPC(7);?(ids2+IDbuffer%+i
ds);
630 NEXT ids2
640 PRINT
650 NEXT ids
660 PRINT'TAB(7)"Press SPACE to con
tinue"
670 *FX 15
680 REPEAT UNTIL GET=32
690 NEXT track%
700 PRINT''"All IDs read !!!"
710 END
```

```
10 REM Read special registers
20 REM By Kevin Edwards
30 REM
40 MODE7
50 osword%=&FFF1
60 oswordblock%=&FFFF0C00
70 REM ***************************
80 REM Read special register
90 REM ***************************
100 REM Select drive 0
110 ?oswordblock%=0
120 REM Buffer address
130 !(oswordblock%+1)=&FFFFFFFF
140 REM Number of parameters
150 oswordblock%?5=1
160 REM Read special register
170 REM command byte
180 oswordblock%?6=&3D
190 REM Register address
200 oswordblock%?7=&12
210 A%=&7F
220 X%=oswordblock% MOD 256
230 Y%=oswordblock% DIV 256
240 CALLosword%
250 PRINT'"Current track = &";~oswo
rdblock%?8
```

Program II

```
10 REM Write special register
20 REM By Kevin Edwards
30 REM
40 MODE7
50 osword%=&FFF1
60 oswordblock%=&FFFF0C00
70 newvalue%=30
80 REM ***************************
90 REM Write special register
100 REM ***************************
110 REM Select drive 0
120 ?oswordblock%=0
130 REM Buffer address
140 !(oswordblock%+1)=&FFFFFFFF
150 REM Number of parameters
160 oswordblock%?5=2
170 REM Write special register
180 REM command byte
190 oswordblock%?6=&3A
200 REM Register address
210 oswordblock%?7=&10
220 REM Register's new value
230 oswordblock%?8=newvalue%
240 A%=&7F
250 X%=oswordblock% MOD 256
260 Y%=oswordblock% DIV 256
270 CALLosword%
280 PRINT"Result = &";~oswordblock%
?9
```

Program III

From Page 105

track register, a seek to track 7 would move the head to the next track not three tracks as would be expected.

The mode register (&17) defines the following information:

Bit 0 – DMA mode
1=Non DMA (default)
0=DMA enabled
Bit 1 – Actuator mode
1=Single (default)
0=Double
Bits 2-5 All zeros
Bits 6-7 All ones

This register should be left alone as altering it can upset the operation of the FDC.

The drive control output port (&23) is used to send signals to certain chip pins of the 8271. Unless you're driving the 8271 yourself you'll never need to touch this register. For example, bit 5 turns the drive on or off – OSWORD &7F does this for you automatically.

The drive control input port (&22) allows the state of various chip pins to be examined. Again, this register has no use from OSWORD &7F.

The bad track registers contain the redundant track numbers for each disc surface – two for each. A point worth noting is that bad track registers must be set to 255 when a disc is being formatted, otherwise, any bad tracks will be skipped and their IDs will be missed.

READ DRIVE STATUS

No data transfer.

Command	&6C
Parameters (n)	0

This command returns the drive status in the OSWORD control block result byte.

The bit meanings of the result are as follows:

Bit 0 – Unused
Bit 1 – Head at track 0
1=TRUE
0=FALSE
Bit 2 – Drive 0 ready
1=TRUE
0=FALSE
Bit 3 – Disc write protected
1=TRUE
0=FALSE
Bit 4 – Index
Bit 5 – Write fault
1=TRUE
0=FALSE
Bit 6 – Drive 1 ready
1=TRUE
0=FALSE
Bit 7 – Unused

The only useful bit of the result is 3 – disc write protected. By reading this bit we can check if a disc has a write protect tab on it without issuing a write sector command to see if it causes a disc write protected error.

The remainder of the bits have no real use when using OSWORD &7F.

SINGLE 128 BYTE SECTOR READ/WRITE

Data transfer does occur.

Commands:

Read data	&52
Read data/deleted data	&56
Write data	&4A
Write deleted data	&4E
Verify data/deleted data	&5E
Parameters (n)	2
Param 1 – Track address	&—
Param 2 – Sector address	&—

These commands are used to access single 128 byte sectors. The two write sector commands allow either normal or deleted data sectors to be written to the disc. The buffer address of the OSWORD block points to the 128 bytes which are to be stored in the sector.

The read sector commands allow normal and deleted data sectors to be transferred to memory. Only the read deleted data command can be used to read a deleted data sector. Again, the OSWORD buffer address points to an area of memory where the sector data will be transferred to.

Last but not least is the verify command. When this is executed the CRC bytes for the sector are re-calculated and compared with the CRCs on the disc.

If the two don't match a data CRC error will be generated. No data is transferred during a verify operation.

The multi-sector commands allow

MULTI-LENGTH, MULTI-SECTOR FORMAT

Data transfer does occur.

Commands

Read data	&53
Read data/deleted data	&57
Write data	&4B
Write deleted data	&4F
Verify data/deleted data	&5F
Parameters (n)	3
Param 1 – Track address	&—
Param 2 – Sector address	&—
Param 3 – Sector length and number	&—

one or more sectors to be read or written from/to disc. Unlike the single 128 byte sector format the sector size can be varied. This means that three 512 bytes sectors or seven 128 byte sectors can be read or written by issuing only one command.

The size and number of sectors being accessed is specified in the third parameter byte of the OSWORD block – more of this later.

With multiple sector commands the sector address is used as a base for the rest of the sectors being read. Thus, if four sectors are read and the base sector is 5, sectors 5 to 8 will be transferred to memory. If, however, sector 6 couldn't be located, the operation is aborted and the "Sector not found" error is generated.

Therefore with multiple sector operations the sectors being accessed must be numbered sequentially.

Although the multiple-sector commands are powerful they are only capable of reading a defined number of sectors from the current track. In other words, if you read 12 sectors from a track which has only 10 sectors, the 8271 will not move on to the next track for the last two sectors but will try to locate them on the current track. This will obviously result in the error *sector not found* (&18).

Therefore when reading or writing several tracks of data a new command must be issued for each track accessed. You should note that the multi-sector commands automatically move the read/write head to the track address specified in the OSWORD block.

The last parameter byte defines the size and number of sectors being accessed – in the same way as the format command.

The top three bits define the size of the sector – see Figure III.

Bits 0 to 4 correspond to the number of sectors being read or written. For example, to read three 512 byte sectors the third parameter would be:

%010	00011 = &43
512 byte sectors	3 sectors

The final program in the series, Program IV, produces a hexadecimal and Ascii dump of every sector on a standard Acorn format disc. Change the variable *max_track%* at the start of the program to 80 if you have 80 track drives.

Bit 7	Bit 6	Bit 5	Sector size
0	0	0	128
0	0	1	256
0	1	0	512
0	1	1	1024
1	0	0	2048
1	0	1	4096
1	1	0	8192
1	1	1	16384

Figure III – Bit patterns for each sector size

And that completes the 8271 command list. As you can see, there's plenty of things you can do using OSWORD &7F.

A word of advice, though. When you're dabbling with your own special disc formats don't use a disc which has valuable data on it – you have been warned!

```
10 REM Read all sectors
20 REM By Kevin Edwards
30 REM
40 MODE7:VDU23;8202;0;0;0;
50 max_track%=40
60 drv%=0
70 osword%=&FFF1
80 buffer%=&FFFF0C00
90 oswordblock%=&FFFF0900
100 REM ************************
110 REM Seek read/write head to
120 REM track 0.
130 REM ************************
140 ?oswordblock%=drv%
150 !(oswordblock%+1)=&FFFFFFFF
160 oswordblock%?5=1
170 oswordblock%?6=&69
180 oswordblock%?7=0
190 A%=&7F
200 X%=oswordblock% MOD 256
210 Y%=oswordblock% DIV 256
220 CALLosword%
230 IF oswordblock%?8<>0 THEN PRINT
"Disc error ";~oswordblock%?8:END
240 REM ************************
250 REM Now set up the OSWORD block
260 REM for read multi-sector
270 REM ************************
280 REM Select Drive 0
290 ?oswordblock%=drv%
300 REM buffer address =buffer%
310 !(oswordblock%+1)=buffer%
320 REM Number of additional
330 REM parameters needed for the
340 REM read sector command.
350 oswordblock%?5=3
360 REM Multi-sector read command
370 oswordblock%?6=&53
380 REM The track number
390 oswordblock%?7=0
400 REM The start sector
410 oswordblock%?8=0
420 REM Size/number of sectors
430 oswordblock%?9=&21
440 REM ************************
450 REM Now begin reading sectors
460 REM ************************
470 FOR track%=0 TO max_track%-1
480 oswordblock%?7=track%
490 FOR sector%=0 TO 9
500 PRINT:PRINT"  Track =";track%;"
 sector ="sector%'
510 oswordblock%?8=sector%
520 CALLosword%
530 IF oswordblock%?10<>0 THEN PRIN
T''"Disc error ";~oswordblock%?10:END
540 FOR row%=0 TO 31
550 PRINTRIGHT$("000"+STR$~(row%*8)
,4)" ";
560 FOR byte%=0 TO 7
570 PRINTRIGHT$("0"+STR$~?(8*row%+b
yte%+buffer%),2)" ";
580 NEXT byte%
590 FOR byte%=0 TO 7
600 val%=?(8*row%+byte%+buffer%)
610 IF val%>=ASC" " AND val%<ASC"~"
THEN VDUval% ELSE VDUASC"."
620 NEXT
630 PRINT
640 NEXT row%
650 NEXT sector%
660 NEXT track%
670 PRINT''"Complete!"
```

Program IV

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The way of the exploding character set

First of a three-part series on how to design customised characters

By ROBIN NIXON

CUSTOM Characters is a utility that enables you to quickly and simply define and use complete character sets without having to type a single VDU 23 statement.

As you may know, to obtain more than 32 user-defined characters it is necessary to "explode" the character set by issuing a *FX20 command.

This can be slightly fiddly and results in the loss of 256 bytes (one page) per set of 32 characters. However since we need 96 characters for a complete set, we need to find three spare pages of memory.

If you look at the part of the memory map in Figure I you'll find that we can just squeeze our character definitions in pages &9, &A and &C.

So as long as we don't try to BPUT or BGET using the cassette filing system, access the speech chip, try to send or receive using RS423 or define more than four envelopes we'll be all right!

This may sound like a long list of negatives but, in practice, most programs will leave these pages free for our purposes.

Now that we've found somewhere to put our character sets, we need to tell the computer where to find them. This is achieved by altering the locations in page 3 as shown in Figure II.

However we need only be interested in the following three fonts:

32-63 Numbers & punctuation.
64-95 Upper case letters.
96-127 Lower case letters.

Numbers and punctuation can go in page &9, upper case letters in page &A and lower case letters in page &C. You may notice that I have left out page &B. This is because it is used as the soft key buffer for the function keys.

So to set up the extra user-defined characters we have to change four bytes like this:

```
?&367=&70 (bits 4, 5 & 6 -
          &10+&20+&40)
?&368 = &9
?&369 = &A
?&36A = &C
```

Fine, but we still have one problem – no user-defined characters. Well, this bit's up to you. Using Program I, define your three fonts and save each with a different filename, such as:

FONT-N
FONT-U
FONT-L

where N=numerical, U=upper case and L=lower case.

Then type in Program II, changing the filenames in lines 210-230 accordingly. You could then attach this listing to your programs in the form of a procedure and load in your character sets when required.

Of course, if you are designing a program with user-defined characters, you could design them using Program I and then simply load them in at &C00 without having to do any poking in memory – making sure you access them as characters 224-255.

● *Next time I'll show you how you can print your character sets out on an Epson compatible printer. In the meantime, happy designing.*

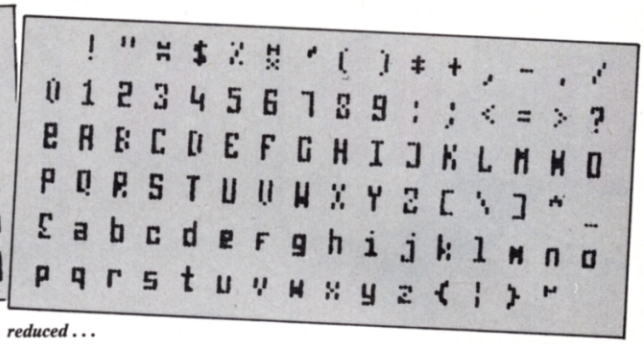
PROCEDURES

getinfo(PC%)	Reads the definition of character *PC%*.
grid	Draws the designing grid.
cursor	Moves the cursor to the correct position on the screen.
showcharacter	Places a character in the grid.
showall	Displays all characters next to the grid.
set(P%,Q%)	Sets a square within the grid.
yn	Waits for Y or N to be pressed.
select	Selects the character to be edited or defined.

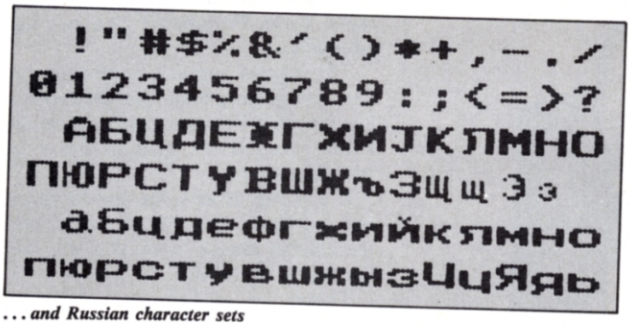
MAJOR VARIABLES

CH% 8	Holds the character definitions.
A%(8,8)	The grid.
OS% 100	Holds the string to be acted on by star commands.
CC$	Character being printed.
PC%	Character being defined.
X%,Y%	Position within the grid.
G%	Your input.
P%,Q% }	Temporary loop variables.
J%,K% }	

Computerised . . .



reduced . . .



. . . and Russian character sets

Full listing starts on Page 144

&900-&9FF	Extra envelope storage area, envelopes 5-16.
	Speech buffer.
	RS423 output buffer.
&A00-&AFF	Cassette output buffer.
	Cassette input buffer.
&C00-&CFF	RS423 input buffer.
	User-defined characters 224-255.

Figure I

&367	The font flag: This byte marks whether a particular set of 32 characters (font) is being taken from ROM or RAM. If a bit is set the corresponding font is located in RAM. bit 6 characters 32-63 bit 5 characters 64-95 bit 4 characters 96-127 bit 3 characters 128-159 bit 2 characters 160-191 bit 1 characters 192-223 bit 0 characters 224-255
&368-&36E	The font location bytes. These contain the high bytes for the location of each font. A font can only start at the beginning of a page so the low bytes are always 0.

Figure II

PROBLEM

HAVING bought a BBC B+ 64k, I was very happy with it until I decided to buy some software. I now find that all modern software such as Elite or Castle Quest will not work.

Is there anything I can do to convert my BBC Micro into a 32k version? I was told in the shop I bought it in that all software would be compatible. – Darren Pollard, York.

SOLVED

Sorry there is nothing you can do to convert these games. Your dealer was not accurate when he said that the B+ was fully compatible. Only programs written in Basic are guaranteed to work.

As the software was not written for the B+ and is probably in machine code it is not surprising they will not work. Try writing to the manufacturers asking if they have B+ versions of their programs.

If you have a technical query that you just can't solve, send it to: "Problems", Mike Cook, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Letters on other subjects should be sent, as usual, to Micromail.

POSTER

By ALAN PRATT

PETE the poster paster has got his letters in a twist and you have the job of sorting out the messages so that they make sense. Fortunately you can use your micro.

The posters appear on screen in the form of a sliding block puzzle, and just like the real thing, you have to move the letters around the grid in order to rearrange them.

If you can achieve the correct result and use fewer than 301 moves to beat the current lowest score, you will join the list of Wizz Kids.

There are in fact nine different problems within the program and each has its own unique solution. And if those aren't enough, you can create your own.

Full instructions on which keys to use and how to move the letters are given in the game. The program will ask each new player's name, which must contain at least one letter and will be truncated to eight, if this is necessary.

The first three puzzles are shown in their correct form before jumbling takes place. Puzzles 4 to 9 are not and part of the test is to identify the four words which make up the puzzle. This is made easier by the use of two colours. To complete a puzzle the blank square must occupy the bottom right position.

The individual letters in each puzzle have been specially chosen to obey the following rules:

- There are two identical letters in the first two words (they may both be in one of the words or one in each word).
- All the other letters in these words are different from each other and also from the two identical letters.
- All the letters in the third and fourth words are different from each other.
- The first two words are on one background colour and the last two words are on a different colour.

The use of two identical red letters means it is not clear which belongs where in the poster. You may not think it matters. However you will find that if they are in the wrong place, even though the first two words read correctly, it will

PUZZLE

be impossible to sort out the last word.

The best you will achieve is two letters in the last word in the wrong locations. Obviously to solve the poser you must now exchange the positions of the two identical letters.

It is this single factor which gives you a 50 per cent chance of sorting out the poster in a relatively few moves or not.

You will see from the listing that the puzzle letters are disguised as a string of numbers in the DATA statements at the end. This makes it difficult for someone typing in the program to work out the correct words in the fourth to ninth puzzles.

Full listing starts on Page 137

How to use the word coding section

THE additional program segment from line 4000 onwards provides a means of encoding words which you may then incorporate in place of one of the existing DATA statement – lines 1910 to 1990 – in the original program.

These lines should be added to the existing listing and a new copy of the resulting program SAVEd on cassette or disc.

To use this word coding segment type GOTO 4000 and press Return. You are prompted for 15 letters comprising the three 4-letter words and the one 3-letter word as read from left to right and top to bottom in the correct form of the poster.

A string of numbers is printed on the screen followed by the letters obtained by decoding these numbers. This serves to check your input. Any lower case letters will have been converted to upper case letters.

To incorporate the newly generated numbers in the Puzzler program select a DATA statement line between 1910 and 1990 (in units of 10). Type in the line number, 1920, followed by the word DATA.

Using the Copy and cursor keys copy the whole string of the numbers and finally press Return to incorporate this new version of the line.

This coding segment may be used up to nine times to replace some or all of the existing DATA statements.

To keep a permanent copy of your new version of the program SAVE it on cassette or disc under a different name such as PUZZLE2.

VARIABLES

solved	Solution is reached flag.
valid	Valid direction key flag.
time	Delay timer.
key	Ascii value of key pressed.
count	Number of moves made.
min	Minimum number of moves so far.
old,new	Position of the + symbol.
P%	Current puzzle number.
J%	Current position of Wizz Kids list.
name$	Current player's name.
A$()	Letters in squares.
D$()	Numeric data for puzzles.
R%()	Numbers for squares in correct order.
N%()	Numbers for present state.
C%	Square colour.
S%()	Holds Wizz Kids' scores.
list$()	Holds Wizz Kids' names.

PROCEDURES

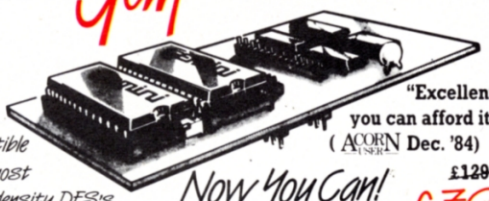
initialise	Reads in the Data.
introduction	Title page. Asks for the player's name.
choose	Returns choice of puzzle as *P%*.
story	Shows correct puzzle with letters or * depending on *P%*.
jumble	Randomises data.
instruct	Instructions
fillposter	Fills the poster in correct order if *P%*<4.
convert	Converts data to appropriate letter; stored in *A$()*.
newlist	Adds the old player's name to the list of Wizz Kids.
board	Fills squares with appropriate colour. *R%*=1, correct board. *R%*=2, jumbled board.
pieces	Prints letters in squares.
box	Fills square box *S%* by *S%* with colour *C%*.
test	Tests for solution.
wait	Delay routine to optimise program.

Gemini

ROMS

DATAGem

The Definitive Random Access, 24K ROM based Database Management System for the BBC B and BBC B+.



Now compatible with most double density DFS's

"Excellent if you can afford it..." (ACORN USER Dec. '84)

Now You Can!

~~£129.95~~ £79.95

DATAGEM

Long hailed as the most comprehensive and powerful database for the BBC, and now becoming a legend in its own right, DataGem has been significantly reduced in price now that development costs have been recovered by Gemini. Whether you have a single 40 track drive or a Winchester hard disk, this system will make use of ALL your disk space, treating up to 4 drive surfaces as ONE CONTINUOUS FILE. Much has been made and exploited of DataGem's superb selective searching capability, and together with its unmatched mathematical powers, the system provides a really professional database for use in the home, office or school that will harness the full power and potential of the BBC micro.

AMATEURS & PROFESSIONALS

For newcomers to databases as well as seasoned users, DataGem represents an ideal starting point. Structuring your file and layout couldn't be simpler using DataGem's on-screen 'painting' format. You can have up to 62 fields or data items wherever you want them on a scrolling 120 x 120 card. Colours are all definable, and field data and field titles may be separated if required. Data entered may be stored in up to 8 tiers or 'levels', as well as within the whole database file. Scan one level or the whole database for records that match your search parameters, and place them in another data level for later manipulation. DataGem also boasts limited facilities for producing data merged letters, and may be configured as a 62 cell spreadsheet.

TECHNICALLY SPEAKING

The System Comprises:-

1. 2 EPROMs mounted on carrier board containing 24K of 6502 optimised machine language. Carrier board may be inserted in either of two positions under keyboard or in sideways ROM board.
2. Demonstration applications disk in both 80 and 40 track format with documented examples of DataGem files. Disk contains no DataGem program code.
3. Full colour packaging consisting of A5 ring binder with professional documentation, user registration card and quick reference card.
4. Utility program named 'Trans' also supplied to allow transference of data files from all other Gemini databases.

The System Features:-

- Permits just ONE file to exist over FOUR floppy disk drive surfaces with a maximum file size of at least 10 Megabytes.
- Allows up to 5100 User Definable Records.
- Maximum number of 62 fields per record, which may be any combination of the following types:-
  STRING – Up to 120 characters long
  DATE – Either two or four digit year dates may be selected.
  TEXT – A field with no data, allowing background text to be placed anywhere on the record. This may then be altered/moved/deleted, even after the database is in use. Up to 3000 characters of background text may be placed on the record in this way, enough for limited word processing and mail-merge.
  NUMERIC
- Allows searches on any field or COMBINATION of fields to ANY depth.
- Up to 9 subsets of data INSTANTLY available and saved to disk automatically.
- Sorts alphabetical or numeric on any field, ascending or descending with NO LIMIT on the depth of sort.
- Interfaces with 'VIEW' and 'WORDWISE'.
- Includes a free format report generator for a completely flexible printing format.
- Allows the user to extend the file or add fields after having started to enter data.
- Offers a free format painted screen which scrolls 120 x 120, and supports extensive mathematics.
- Provides User defined field relational variables and multiple and single character wildcards.
- Exists self contained on ROM, and does not require additional utilities on disk.
- Finds the occurrence of a string or partial string in ANY field in the database with just one command.
- Mathematical Operators
  +, –, ★, /, multilevel parentheses (up to 50 levels), unary negation.
- Logical Operators
  >, <, >=, <=, <>, =, ★(AND), +(OR).

WHAT OTHERS SAY

DataGem provides many of the Spreadsheet facilities of an item like Lotus 1-2-3... Combined with a Word Processor, it forms the basis of a very competent small business system.
Personal Computer News – July 1984.

DataGem stands out in terms of both price and performance. Excellent if you can afford it.
Acorn User – December 1984.

NEW DATAGEM GUIDE

Available separately to existing owners of DataGem (see below), this new and comprehensive manual has just been completely re-written by Simon Williams, a veteran press reviewer and writer. The new guide takes you step by step through all the facilities of the program with worked examples, and without any requirement for a previous knowledge of databases. It contains over 40,000 words and is fully indexed.

MONEY-BACK GUARANTEE

The power and facilities of DataGem are just too great to detail in this advertisement. As the product is protected against unauthorised copying, we are able to offer our no-quibble money-back guarantee to customers purchasing DataGem direct from Gemini. If you don't agree that it's worth the price, send it back to us undamaged within 7 days of purchase for ANY reason and we'll refund your money – immediately.

STOP PRESS!!

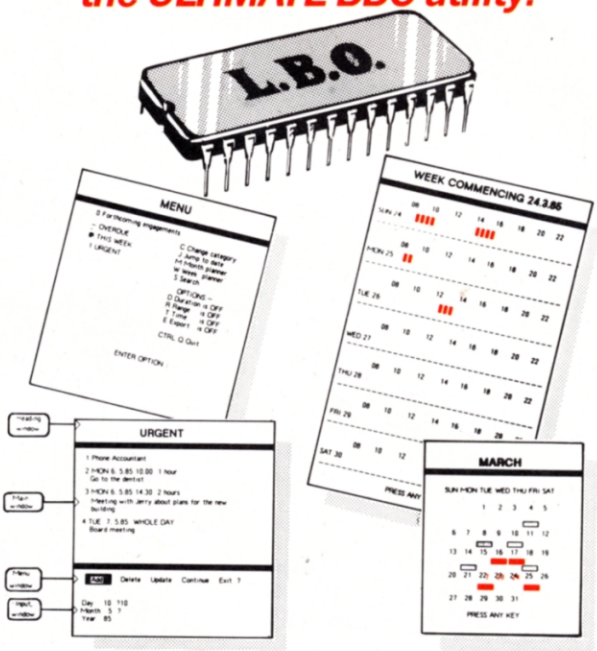
New DataGem owner's manual (see above) available separately at

£12.95 inclusive

Price refundable against purchase!

L.B.O. LIFE & BUSINESS ORGANISER

– the ULTIMATE BBC utility!



A NEW & EXCITING ROM RELEASE FROM GEMINI

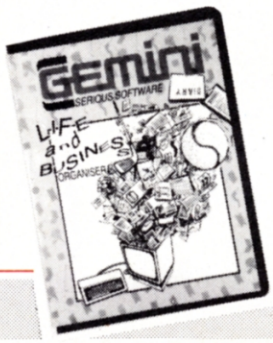
This is a comprehensive life and business organiser package in 100% machine code which has been very carefully designed to provide a wide range of useful facilities for the busy person at home or in the office, and is simplicity itself to use. Once you start using LBO, you'll ALWAYS use it – not like one of those ROMs you only occasionally call on. LBO will put an end to forgetfulness and ensure that your time is organised, you know what you have to do and when, you don't forget bills or birthdays, and you are reminded constantly of urgent matters.

LBO was written by two graduates in Computer Science from Exeter University in consultation with a lecturer in Cognitive Psychology. It has been very cleverly researched and programmed and is confidently recommended by Gemini as a very superior program for the very superior BBC micro.

Features include:-

- Automatic reminder of entries overdue for attention
- One week's advance notice of forthcoming events
- Urgent notice board
- Creation of categories of entries; e.g. bills, birthdays, letters to be written, notepad etc.
- Sorting of appointments by date and time of day
- Month AND week's summary at a glance, indicating time booked and free
- Single entry of a RANGE of events and updating of regular happenings
- Super search facility to call any event by any related word or part word
- Month by month preview of all forthcoming events
- Built-in intelligent calendar
- All data saved to disk
- Full printer support
- Easy to follow documentation

Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are every likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life, LBO is GREAT FUN TO USE!



L.B.O. only **£19.95**

Also available on DISK for those with a cluttered ROM board – £19.95.
QL version also available now, MS-DOS version early 1986.

Gemini

DISK SOFTWARE

DDD Suite

THE REVOLUTIONARY 'TRIPLE-D' BBC DISK INTEGRATED SOFTWARE SYSTEM

Of great significance to businessmen, educationalists and hobbyists alike, these programs are certainly the most powerful and sophisticated of their breed, and may be used 'stand-alone' or together as a suite. Gemini have probably the most experience in writing serious software for the BBC micro, with classics such as BEEBCALC and BEEBPLOT achieving sales of tens of thousands of units. We have drawn on almost four years of experience and user feedback to produce what we are confident will be hailed as the ultimate in functional software for the BBC micro: the ***'TRIPLE-D'*** Integrated Suite. We've also brought it in at a price that should make it accessible to more of you, and most importantly, we're giving you REAL value for money.

The modules, which are formatted for both 40 and 80 track systems, are available separately, or as an economical combination pack. Each module is clearly documented with a comprehensive, indexed manual, with training sections that refer to demonstration applications provided with each disk. Remember, ***'TRIPLE-D'*** uses proper random-access files that will take advantage of your true disk capacity, even over TWO drive surfaces. Have you ever heard of a true disk-based spreadsheet before? Well it's here now in the form of the ***'TRIPLE-D'*** suite and can handle up to 52,000 FILLED cells! If you already have our 'DataGem' ROM database, you'll be pleased to know we've even included some special utilities for you!

I confidently recommend the ***'TRIPLE-D'*** suite to you. If you purchase the product from us and don't share my enthusiasm, return it to us in new condition within seven days of purchase and we'll refund your money – immediately and without quibble.

Dale Hubbard
Chairman & Managing Director
Gemini Marketing Limited

DDD-BASE £29.95

- Up to 2000 records, 1 search level subset, 26 fields/record, 2 drives, 79 chars/field
- Scrolling screen, 79 x 26. Interrupt driven real-time clock
- Layout painted on-screen to your design, including background text/graphics
- Fully menu driven, with powerful line editor and access to *OS commands
- Default entry capability, no need for tedious re-typing of repetitive data
- Lightning search using advanced 'hashing' techniques
- Powerful maths, allowing all BASIC functions, on any field
- 10 user-defined variables to simplify complex calculations
- Multiple level 'intelligent' sort – program only sorts 'out-of-order' data
- Printed reports in record or summary format. Data spool option for transfer to other files
- FULL DATA COMPATIBILITY WITH 'DDD-CALC' AND 'DDD-PLOT'

DDD-CALC £29.95

- True disk-based spreadsheet, 2000 rows, 26 columns, 52000 cells. Powerful line editor
- Fast, smooth machine code screen scroll with pop-down menu
- Individually adjustable column widths with text overflow
- Full relative and absolute replication
- Find and move to a row by name
- User defined variables, delete/insert rows, SORT rows with 'DDD-Base'
- Send data from all or part of sheet to printer, or just print cell formulae
- Data over 1 or 2 drive surfaces
- Fast recalculation, even over large files
- All BASIC functions allowed, plus 'SUM', 'MAX', and 'MIN'. *OS calls, and real time clock
- Data spool option for merging with other files
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-PLOT'

DDD-PLOT £29.95

- Stunning menu driven colour graphics using the BBC's capability to the full
- Pie charts, histograms, scatter graphs, line graphs and function plotting
- Disk save of screen for instant recall within your own programs
- Superb data entry editor with up to 255 plottable data entries for text and x/y coordinates
- Automatic scaling with user override
- Screen customisation allowable after plotting for background text etc., with up to 64 columns in Mode 1
- Disk save of ALL data
- Statistics facilities include mean, max, min, standard deviation, line of best fit, correlation coefficient etc.
- Colours re-definable for any plot
- Epson m/c fully SHADED screen dump with interface for other dumps on request
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-CALC'

Combo Pack – All 3 modules £69.95

NEW!

MONEY MANAGEMENT

This program is designed for disk users. It allows individual transactions to be stored and retrieved in respect of up to 5 separate Bank/Building Society/Investment accounts AND up to 5 Credit card/loan/Mortage accounts.

The transactions are also analysed – and may be (screen) listed – under 3 separate Income and 15 separate Expenditure headings.

Each transaction consists of:

(1) Date
(2) Description – up to 16 characters
(3) Amount
(4) Last 4 digits of cheque no. or a credit card transaction reference. (Payments only)

Account and income/expenditure headings may be personalised.

Budget amounts can be stored for each of the 15 expenditure heads and a report shows how expenditure to date compares with the budget. It also shows the balance remaining. This report is also produced in percentage terms and a third report forecasts annual expenditure based on expenditure to date at any particular time.

A further report gives balances for each Bank/Loan account at the beginning of the year, balances for each income/expenditure account to date and the resultant Bank/loan account balances. This report represents, therefore, the changes in liquid assets and liabilities over the period, both in terms of totals and of distribution between accounts.

The main menu contains a print option for this report.

Lists of outstanding cheques or credit transactions may be produced for each account and when statements are received, input of the cheque reference no. (last 4 digits) and the amount causes verification to occur (on screen), whereafter these cheques are removed from the cheque no. file, the remaining list of unpresented cheques allowing simple reconciliation of each Bank a/c. Similar reconciliation of credit card a/cs can be achieved.

The program caters for transfers between accounts (e.g. from Bank to Building Society a/c or from Bank to Credit card a/c etc) the relevant details being input only once.

The program also allows for standing orders to be set up on any single account or between any two accounts. These are paid simply by inputting a date up to which the payment of all orders should be recorded. The necessary debits and credits are then created and the date of each order is reset. Orders can be for any multiple of calendar months.

The program is fully menu driven and all areas of input are 'range protected'. As much guidance as possible is included in all screen displays and the user is always given the opportunity to abort a transaction.

Full amendment and deletion routines are provided; for individual transactions, for Standing orders and for budgets.

The main file can hold between 800 (all full length descriptions) and 1800 (no descriptions) transactions. The former should be sufficient for most people for at least one year and the index file size is set on this basis. A warning is flashed on the main menu when the main file reaches 750 transactions. Account balances may be carried forward to a new set of accounts.

All you will ever need in a home finance package and beautifully [illegible]ted.

ONLY £12.95
Highly Recommended

Gemini VALUE!

With over four years experience of providing practical software solutions for business and home applications, Gemini have put together a selected range of famous titles for the BBC and BBC Plus in TWO special packs, at VERY SPECIAL prices. These super value packs contain all the serious application software you're ever likely to need for your BBC, from spreadsheet and database management to a complete professional business accounting system. Gemini's 'OFFICE MATE' and 'OFFICE MASTER' packs are here – put that computer to WORK!

• DATABASE • BEEBCALC SPREADSHEET • BEEBPLOT GRAPHICS • WORD PROCESSOR • FULL DOCUMENTATION

DATABASE

Use this program for storing all types of information just the way YOU want to store it. You set up a computerised 'card index' system and add records and data to the file in the format that you choose.

Advanced features include sorting and searching for specific records, mathematical calculations, printer routines, data summaries etc. If you don't have a database, you certainly should!

BEEBCALC SPREADSHEET

Perhaps the most commercially successful item of business software yet written, the Gemini Spread Sheet processor offers a very wide range of invaluable calculation and editing features.

Consider, for example, a Cash Flow forecast containing rows and columns of figures, combined with text and numbers. If say, the cash receipts for January need to be changed, it would normally be necessary to delete and recalculate several figures for each successive month.

With BEEBCALC, however, an 'on screen' amendment to the January figure is made, and the corrected figures for each successive month automatically appear upon touching the 're-calculate' key.

Formulae cells in the table may be specified which relate to each other and then copied RELATIVELY or ABSOLUTELY to other parts of the program, which in itself is modular, and directly linkable to other Gemini programs. BEEBCALC has a complete range of inbuilt data entry and formatting techniques, and the structure of the table may be amended at any stage. Of course, full printer facilities are included which allow for either the table to be printed or just the data and formulae relating to the table. Another important feature, any valid BBC BASIC formula is acceptable as data entry making the system immensely powerful and versatile. BEEBCALC's sister program, BEEBPLOT will take data from disk or tape files created by BEEBCALC to provide data portrayal in graph, histogram or pie chart format.

BEEBPLOT Graphics

Written specially for use with the BBC micro, this program makes full use of the high resolution colour graphics to provide an easily assimilated visual representation of numerical data.

For example monthly sales statistics comparing two year's results may be instantly converted into two side by side pie charts, histograms or graphs ... for easier visual comparison and assimilation.

BEEBPLOT also incorporates a built-in machine code screen dump, enabling a high resolution printed image to be produced using an Epson or similar bit image compatible printer. It also interfaces with other Gemini programs such as Beebcalc and Cash Book and is particularly recommended where any kind of mathematical plotting facility is required.

WORD PROCESSOR

This program provides many routines found in large and more expensive packages. With a typical word length of 5-6 letters it allows for up to 1000 words in memory at one time and is ideal for the user who wishes to write any kind of business letter on a home computer.

Features include: block delete, block insert, search and replace, edit text, display text, and many more.

Step up to Office Mate and save money!
(Price if purchased individually - £79.80 – save £67.80 with this pack)
Electron version available,
pack contains Database, Beebplot, Beebcalc, Home Accounts,
Cassette only.

OFFICE MATE
£12
Cassette or Disk

• CASH BOOK • FINAL ACCOUNTS • MAILIST • EASILEDGER • INVOICES & STATEMENTS • STOCK CONTROL • FULL DOCUMENTATION

CASH BOOK

Gemini's CASHBOOK is a complete 'stand-alone' accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cash book system and will provide you with a computerised system complete to trial balance.

Simple to use, this program will replace your manual cash and bank records and provide vital management information at any time. It will take you from sheaves of invoices and cheque book stubs to trial balance, and may, if desired, be used in conjunction with the Final Account program.

Typical information from CASHBOOK is as follows: **1.** Summary of VAT information to enable completion of VAT returns. **2.** Cumulative receipts and payments report analysed over the standard profit and loss and balance sheet headings. **3.** Option for departmental analysis of sales and purchases. **4.** Printout of all transactions, nominal account balances etc. **5.** Journal routine for entering transfers between accounts and year end adjustment for debtors, creditors, etc. **6.** Trial balance. **7.** Full audit trail facility.

This program is recommended not only for businessmen, but also for practising Accountants for use in the preparation of Accounts from incomplete records; a printer is essential.

FINAL ACCOUNTS

Requires Gemini 'CASHBOOK' module (except Commodore 64 version)

This program will take data prepared by your Gemini Cashbook module and produce a complete set of accounts for you in the following format: **1.** Trial Balance with inbuilt rounding routine. **2.** Notes to the Accounts. **3.** VAT summary. **4.** Profit and Loss Account with comparatives facility. **5.** Balance Sheet with comparatives.

All reports may be produced at any time interval comparing actual to budget if required.

MAIL LIST

Gemini's Mailist program will enable you to keep a record of names and addresses and then print, examine, sort and find themn, all with special selection techniques. All our mailists contain our exclusive 'SEARCHKEY' system, giving you the option of creating your own dedicated coding system for each name on file. For example, on most mailing list systems, you are only given the standard heading such as name, street, town, country, postcode etc. With the Gemini searchkey system, you could find, say, all names on the file that are companies having a turnover in excess of '50,000' or all names that are subscribers who are behind in their subscriptions or all names that are eligible for a Christmas card this year!

A full and useful range of routines is included in the menu, and the program allows you to set up your own format for printing labels, i.e. the tab settings you require and spaces between labels, etc. Multiple copies can also be printed.

EASILEDGER

Contains routines to enable the small business man to keep a record of one of the most important aspects of his business – cash flow.

EASILEDGER is essentially a debit/credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information. Its flexibility lies in its ability to produce account balances instantly for debtors and creditors, together with a record of all transactions, dates and references. A year-to-date summary of sales, purchases, receipts and payments over the twelve month period is also provided, as is a complete INTERACTIVE bank account database.

EASILEDGER is a management aid software tool and is designed to run alongside an existing accounting system. If you operate a cash based business and require a complete accounting package to produce the accounts to trial balance and beyond then we recommend you consider using both Easiledger and Cashbook programs together.

INVOICES & STATEMENTS

The Gemini INVSTAT program greatly reduces the time and cost of preparing Invoices and Statements by storing essential information such as customer names, addresses and account numbers, VAT routines and footer messages such as 'Please remit by return', 'Overdue and outstanding', etc.

Not only are Invoices and Statements produced more quickly and accurately, but pre-printed forms for them are eliminated since the INVSTAT program produces professionally formatted documents using your own printer.

STOCK CONTROL

You have a stock of products. With the Gemini program you may enter details of each product on to a record card on the computer with details of your own existing part number (if any), a description of the product, the unit quantity (i.e. one, a gross, a pair, etc.), the cost price per unit, the selling price per unit, a specified minimum satisfactory stock level, units in stock ordering quantity and supplier details.

The program will allow you to enter stock received, stock out, and will also give you a summary of stock items and current holding, together with details of total cost of stock, total sales value of stock, current gross margin on stock, cost of bringing stock up to minimum level, understocked items, etc.

Each stock item has its own computerised record and you may browse through the file as a whole, or just a specified number of records. An extremely powerful program, highly recommended for inventory control in small and medium sized businesses.

OFFICE MASTER
£25
Cassette or Disk

Gemini INTEGRATED ACCOUNTS & HARDWARE

WHY INTEGRATED ACCOUNTING?

Because it will retrieve information stored in one program for use by another, and store data in one program which has been generated by another.

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Because, although originally designed as an educational computer, it has the facilities needed for serious business use. In particular, speed of operation ... although only an 8 bit machine, it has a faster operating speed than many 16 bit micros. By gearing a suite of Integrated Accounting programs to the BBC Micro, Gemini have produced a combination of excellence which will eclipse any other computerised business system in its price bracket ... and many other systems in much higher price ranges.

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INTRODUCTION

Designed for the small to medium sized business user, where speed and efficiency are vital, Gemini Integrated programs are suitable for sole traders, partnerships, or limited companies. All require a BBC B 32K microcomputer, and an 80 column printer. A double disk drive with an Acorn compatible DFS is required for integrated accounting purposes. A single disk drive may be sufficient where modules are used independently, although this is not recommended for the Sales Ledger and Invoicing module. The manuals indicate the system capacities for various disk drive combinations.

The programs have been devised by H.C.C.S Ltd in the light of substantial mainframe computing experience, and share many of the features normally found only in very large installations. Used in a typical business environment where invoicing, sales ledger posting, stock control adjustment and nominal ledger posting is simultaneously made, the software will convert the BBC micro into a business computer of enormous power, directly comparable with hardware/software combinations costing many times its price.

Each program is supported by a comprehensive, easily followed manual, and 'user friendly' screen prompts with error trapping routines, which make a specialised knowledge of accountancy unnecessary for the average user. All the programs, however, have many sophisticated features which make the programs revolutionary for the home micro market.

Gemini Marketing Limited confidently recommend the programs to serious commercial owners of the BBC B micro as software capable of making an enormous contribution to business efficiency and profitability at minimal cost, since it requires no expensive second processor in order to achieve the advantages of integrated accounting.

INDEPENDENT PRESS COMMENTS

John Vogler reporting in December 1984 edition of 'A & B Computing' said of Gemini Integrated Accounting when comparing to Peartree, Micro Aid, Software for All, Acornsoft Mirle and Sage:–

"This is the newest and most exciting. To have achieved a substantial degree of integration, very rapid file access and respectably large file sizes, without the use of a second processor, is a fine achievement. As one would expect from GEMINI, the individual modules are eminently professional and for the first time present the single processor BBC as a viable small business computer ... GEMINI have produced a superb product ... superb examples of the programmer's art."

INVOICING & SALES LEDGER

The Gemini Sales Ledger and Invoicing program will produce invoices and statements for customers and enable a tight control over credit procedures to be maintained by producing aged debtors reports, and by keeping current information concerning customer accounts.

The module can be used independently or interfaced with the Gemini Nominal Ledger and Stock Control modules, and offers the following advantages: ● Maintains open-item sales ledger. ● Comprehensive customer Master File maintained in memory. ● Choice of fixed and free format invoices. ● Integrates with Gemini Nominal Ledger and Stock Control modules. ● Prints invoices, invoice copies, statements and credit notes. ● Reports include: Aged Debtors, Sales Daybook Sales analysis by user defined code, VAT analysis, Audit trail giving copy details of all transactions. ● Automatic updating of sales ledger. ● Comprehensive accounting controls including period end close down routines and full audit trail for all transactions. ● Examine customer status by file enquiry to screen or printer showing year to date activity. ● Trade and settlement discount terms definable for each customer. ● Caters for up to 5 rates of VAT. ● Can hold up to 135 customers on 40 track disk system and up to 610 customers on a 80 track disc per Sales Ledger file. ● Comprehensive analysis of invoices over unlimited, user definable sales codes.

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PURCHASE LEDGER

Used independently or interfaced with the Gemini Nominal Ledger, the program maintains a complete file for each supplier, records amounts outstanding at any time, helps to determine which invoices are payable, and payment dates for the claiming of discounts. Among this module's many features are the following: ● Automatic posting of suppliers' invoices to Purchase Ledger. ● Comprehensive analysis of invoices over unlimited, user definable expense headings. ● Comprehensive accounting controls including period end close down routines with posting reports, and full audit trail facilities at appropriate stages of processing. ● Full integration with Gemini Nominal Ledger module. ● Purchase invoices and credit notes easily processed. ● Supplier file held in memory, with full details of each supplier. ● Maintains open item purchase Ledger. ● Management of invoices due for payment within cash restraints. ● Maximum number of suppliers on 40 track disk system of 135 and maximum of 610 suppliers on 80 track disk system per Purchase Ledger file.

Price £69.96

NOMINAL LEDGER

This is the central module of the Integrated Accounting system and may also be used independently as a Cash Book or interfaced with the Sales and Purchase Ledgers and payroll programs. It includes the following main features: ● 143 Nominal accounts all of which are user-definable. ● Posting of transactions from Sales and Purchase Ledgers and Payroll modules. ● Full Cash Book facilities. ● Print out of full Trading and Profit and Loss Account and Balance Sheet together with notes to the accounts. ● Full accounts may be produced for whatever period chosen by the user. ● Comprehensive accounting controls including period end close down routines and complete audit trail for all transactions. ● Journal feature for adjustments between accounts and correction of book-keeping errors. ● Reports include: Account Master File showing complete code listing. Cash Book entry details. Journal printouts. Trial Balance. Trading and Profit and Loss Account with notes. Balance Sheet with notes. Audit Trail Enquiry for all accounts. ● Account enquiry showing movements over the period under review including opening balance, period end adjustments and closing balance. ● Account posting masks allow conversion of analysis codes set up in other modules into selected user-defined Nominal Ledger codes.

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PAYROLL

This program provides a full range of controls over the different aspects of Payroll Accounting icluding tax and other deductions. It can be used independently, or interfaced with the Gemini Nominal Ledger, and offers the following facilities: ● Employee file maintained in memory, containig: Name, address, sex, marital status, National Insurance Number and contribution type, date of birth, personnel number, department, date employment commenced, all applicable tax codes, whether week 1 or month 1 applicable, hourly or salaried, pay cycle, payment type (cash, cheque or direct transfer), PAYE reference number, previous name, bank details. ● Supports weekly, fortnightly, four weekly or monthly employees. ● Company master file containing: Name, address, bank account number and name, bank name and branch, PAYE reference. ● Produces cash analysis of note and coinage to suit requirements. ● Employee pay details include: Gross pay and tax paid to date both current and previous employer. National Insurance contribution for employer and employee. Five rates of overtime per employee. Up to 12 standard and 5 non-standard pay elements per employee. Basic pay. Hourly rate. ● Reports include: Payroll reconciliation, Payslips, Coinage analysis, Cheque and bank giro list, Payroll masterfile, Departmental analysis. ● Relevant data to complete Inland Revenue forms including: P11, P35, P45, P14/P60. ● Maximum 98 employees on 40 track disk system and 198 employees on 80 track system per Payroll file.

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STOCK CONTROL

A program providing full control over every aspect of stockholding operations which can be interfaced with the Gemini Sales Ledger and Invoicing program, this module includes the following features and routines: ● Inventory Master File holding details of part number, selling and cost price, sales and product code, current stock, location of stock, allocated items, re-order level, quantity on order, current period activity and supplier code. ● Permits four types of transactions – sales, returns, receipts and adjustments. ● Part enquiry routines for any stock item. ● Reports include: Part catalogue, giving stock sales and cost values. Re-order report. Evaluation stocks list, giving stock sales and cost values. Dormant parts report. Delete parts report. Stock usage report. Stocktaking sheet. Stock audit report sorted into part sequence and transaction type and date. ● Screen prompt when item falls below the minimum re-order level. ● Directly interfaces with Sales Ledger to enable automatic generation of product details for invoice production and adjustment of stock records. ● Maximum 980 part numbers on 40 track disk and 1980 on 80 track disk per stock file.

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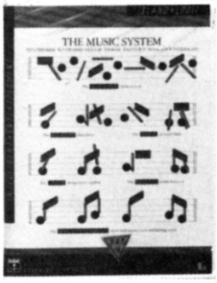

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SYSTEM SOFTWARE

A taste of village life

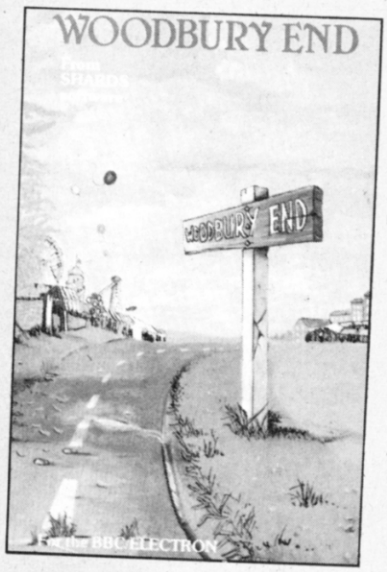
More tales of adventure by Alice

BY coincidence I received two adventures that take place in English villages yet contrast in almost every other way. The first is Woodbury End by Shards Software, a company that tends to offer unusual "off the beaten track" puzzles, often using graphics as clues.

Woodbury End is a quiet, sleepy village and you have 20 "real time" days to unravel its sinister secret and obtain a confession from someone – or is it something?

The insert gives a long, detailed introduction to the strange happenings of the previous 25 years and the overall impression is that in 1953 something along the lines of John Wyndham's Midwich Cuckoos took place. That is, aliens landed nearby and have gradually taken over the village by brainwashing everyone, particularly the children, in the funhouse of a peculiar, permanent fair called the Paradisia.

After all this intriguing detail it was disappointing to find that the actual game is a simple VERB NOUN with



short descriptions and very crude pictures. You always have to grope in the dark for the exact two words in such games, and this is no exception.

The insert says that "you start in a darkened room, bound with rope and suffering amnesia". Following the instructions I used I for Status – because S means South – and discovered that it is dark because you are blindfolded and also you cannot move in any direction.

I therefore tried H for Help, but all I got was a perplexing set of about 15 cryptic clues, such as "leave the beast but look at least", "be wise with wise eyes" and "digital doitall".

Eventually I tried OPEN DOOR and got "you roll over and cut your hand on glass" so CUT ROPE followed by CUT BLIND (it does not understand UNTIE, you get "try another word") and "you are in an old empty hut, the window is barred".

EXAM GLASS gave a crude picture of some yellow triangles so S for South through the door (now I can see I can also move) and down to the village for a pint in the pub.

Actually I'd spent so long working up a thirst escaping that everything was shut and/or empty – school, market place, the green, even the police station only contained a chained-up bicycle, so the local copper was probably walking his beat.

There are 14 interactive characters, but you have to wait a while to meet them.

After a "couple of days" I was still in the dark as to what was going on so I decided to try some "break and enter".

Unusually for Shards, this game is in machine code and I didn't have my "jemmy" with me.

A real classic

Intending to return to Woodbury End better prepared I next loaded in Village of Lost Souls by Magus, a new company to me. I did not bother to read the blurb this time, partly because the tape label and the insert are both rather crude if not unprepossessing, so I was totally unprepared for the quality of the game. It is, in a word, classic.

Again the setting is a quiet English village, but this one is in the 14th century and the reason it's quiet is because everyone appears to have been brutally murdered.

Unlike Woodbury End, you have no difficulty in wandering around the village. Almost every home you enter is splattered with blood and bodies, usually described in such minute and gruesome detail it makes you want to hurriedly move on before the rot sets in.

Wearing the right boots is no help to avoiding this shambles either. If you try to leave you always get scent back to sniff around again.

The text is prolific, 34k apparently, even more than the ghost of Adrian Mole could write in an evening. But it is also very cleverly interlaced with sub-plot puzzles so a new location plus updates can fill the screen. Here's an example:

"You are outside the rectory, behind it you can just see some fine buildings and to the southeast, the church, Exits lead north, east, southeast, west, northwest and southwest.

"A bird appears and circles overhead looking at you . . .

"The smell of burning dies away . . . a dying whisper is carried by the breeze . . . too late. There is an unkempt pack of curs here snapping and fighting amongst themselves. Woof . . . bark . . . snarl".

The sub-plots are the bird, the pack of dogs and the smell of smoke. You quickly realise that the bird is a magpie and will regularly steal one of your possessions until you are empty handed – it then flies off with a caw of disgust.

The pack of curs is a similar nuisance because once they find you they dog your steps unless you enter a house, and run off with all objects before you can pick them up.

The smell of smoke is a hut that you must locate and enter before its vital contents are destroyed.

None of this actually stops you exploring the village, but you soon realise that the game is BIG. Reviewers

→

From Page 119

are told that there are well over 200 "rooms" and 140 objects.

Although logically laid out, the locations often have many exits, so a map is vital for finding out how to avoid the bird, the dogs, get to the hut quickly and so on.

This is only the beginning because, despite finding dozens of objects including a jade necklace I still had yet to score anything out of 1200. However I eventually found a staff in a twisty maze (actually a featureless fallow field) that not only rattles but also emits a blue white flame from the tip. Unfortunately its only a one-shot staff, unlike the six-shooter in Twin Kingdom Valley that sees off everything including dragons.

After a few more hours I was finally making some progress by being repeatedly sucked dry by a vampire that seems immune to all the regular remedies – garlic and salt just whets his appetite – and he, indeed the whole game, is a real challenge for the seasoned adventurer.

Apart from all the detail, sub-plots and superb black magic atmosphere, there are some dreadful puns that you are almost guaranteed to make it regurgitate.

For example you find that you are wearing a "dirty habit" so who can resist DROP HABIT?

Another anticipates that you will EXAMINE all objects so you find a paddle and are told that it is "made of ROWAN because that's what it's good for".

If all this is too puzzling you can always ask for Help – but all you get is: "Write to the Magus and we majus help you".

Actually you will have to write once because the game is only available by mail order – price £9.95.

I recommend that you do because, if you want a game that compares with Level 9 at their best, then this is it.

SOLUTIONS

I have only received partial solutions to Dudeney's 7*7 puzzle from the November 1985 issue of *The Micro User*. One reader, Ian Pain of Fareham, has got the date right – JULY THE TWENTY-SECOND – but his tour goes outside the 7*7 array and this is not necessary. There will be a full solution next month, but in the meantime the place is near THE White Horse.

Two people have managed to "overwhelm" the Pellian program in the December 1985 issue, namely Steven Chmiel and David Vickers, but neither has managed to correctly decode the number of the editor's deposit box in Zurich.

Hint: The Pellian(61) really does "overwhelm" the BBC Micro. You will have to use modulo arithmetic.

Holiday horror

If you missed the summer of '85 (I was having a shower at the time) and are planning a sunny holiday "extranjero" this year then Terrormolinos from Melbourne House might make you think again.

Written by the authors of Hampstead, reviewed in the December 1985 issue of *The Micro User*, it is just as funny but this time they revel in revealing all the drawbacks and disasters of the petit bourgeois Britannique en vacance.

You start almost totally unprepared in Slough with the taxi, hired by your wife Beryl, due to arrive in 35 moves, so your first tasks are to locate your tickets, passport and other paraphenalia, round up the wife and two kids and quickly pack a suitcase before the taxi leaves in disgust without you.

Actually my biggest problem was how to get into the taxi without getting run over.

But eventually we made it to the airport, through customs first time (this was because I'd missed the taxi so many times that I knew the house from top to bottom and had found everything), got packed on to the plane and checked into the Hotel Excrucio (pronounced Excruthio) where you can really start to enjoy your holiday.

By this time you will have discovered that – just as in real life – the kids are always hanging around until you want them.

The instant you unpack they wander off as do some of your fellow pain-in-the-neck passengers particularly the appalling wino Mr Snargsby, who seems to think this is an 18-50 Club

PUZZLE

THIS month's puzzle is based on the card game Eleusis (pronounced ee-loo-sis). The simplest version is for three players, one of whom plays God by writing down a simple rule – such as play alternate red then black cards – and then the other two players, each with 26 cards, try to induce the rule by laying down a card or cards from their hand.

If God says "Right" then the player can continue to experiment

```
10 DIM A(14)
20 FOR C=1 TO 4
30 READ T
40 DATA 19,22,23,26
50 GOTO70
60 PRINT"WRONG - START AGAIN"
70 FOR N=1 TO 14
80 A(N)=0:REM Clear array
```

outing. Apart from keeping an eye on everyone you must also avoid sunstroke, food poisoning, vagrancy, drowning and being gored by a colour blind bull plus take 10 photographs to show what a good time you are having.

The neat gimmick of this game on other micros is that if you take a good photograph then a "Donald McGill" type picture appears on the screen. Sadly this revealing feature isn't available on the BBC version.

The whole game involves clever variations on the disasters of a dumb family on holiday in Spain. Very funny but fairly predictable, hence not very difficult.

I scored 67 per cent in about three hours and finally left Mr Snargsby wandering the catacombs of the monastery because I only had my trunks left to drop in order to map this maze and the guardia civil arrest you for indecent exposure wherever you are – that is unless you are being eaten by a shark.

Reign of the robots

A far more sober society is to be found in The Worm in Paradise, the

with more cards. If, however, God says "Wrong" this can also be useful information, but the other player can then test his theories.

The game is won by a player either getting rid of all his cards (such luck is unlikely) or guessing the rule.

The difficulty of making this game into a program is that you can see the listing, so my rule is fairly complex. However to compensate for those who cannot read a listing, I have given in Table I a "Right"sequence for the first 45 cards (N.B. 14 means one of the four jokers in the pack).

1	13	5	12	2	11	6	10	3	9	7	8	4	14
1	12	9	10	3	8	11	6	5	4	13	2	7	14
14	3	6	5	12	7	4	9	10	11	2	13	8	1
14	2	10	?	?	?	?	?	?	?	?	?	?	?

Table I: Sequence for the first 45 cards

Hopefully you do not need to be "computerate" in order to work out how to play the last 11 cards and then tell me what the rule is.

The prize goes to the simplest explanation of how to play your cards "Right".

```
 90 NEXT N
 100 INPUT "Put down 1 card (1=Ace t
o 14=Joker) ",F
 110 A(F)=1
 120 L=F
 130 FOR K=1 TO 6
 140 INPUT"Put down two more ",M,N
 150 IF A(M)=0 THEN A(M)=1 ELSE 60
 160 IF A(N)=0 THEN A(N)=1 ELSE 60
 170 IF L+M+N=T THEN L=N ELSE 60
 180 NEXT K
 190 INPUT "Put down one more ",M
 200 IF L+M+F=T THEN PRINT"OK so far
" ELSE 60
 210 NEXT C
 220 PRINT"All done"
```

third and final episode of the Silicon Dream series by Level 9.

The time is the future and the place is Eridani E, a planet run by robots. What seems to worry Pete Austin is that humans are hedonists and, given free comfort and entertainment, will simply opt for a life of pointless leisure provided by machines.

Such a theme has been dealt with, together with possible solutions to the boredom, in books such as Erewhon by Samuel Butler and The City and the Stars by Arthur C. Clarke, and it is interesting to see if such themes could be dealt with in an adventure.

According to the insert introduction, you will wake up in an alien world which is closely supervised by robots whose aim is the greatest good for the greatest number, which means a 1984 type police state where you can be fined for almost anything.

The idea of the game is for you to work out the rules of this society and then complete various tasks to score a maximum of 1000 points.

Each task scores 40 points, but not all are critical – for example I completely missed the opening "adventure within an adventure" and just waited for the Reveline dream to finish.

Maybe some "On with the motley/ tradclads" muzak (from I Pagliacci which, also has a plot within a plot) would have made me more suspicious.

The main problem is how to explore the city of Enoch without breaking too many laws and getting too heavily fined. Like Terrormolinos, public nudity is a crime outside the privacy of your own home, but finding home is a major puzzle because you have to decode an extremely confusing zipcode.

Players of Snowball will remember the clever colour code on the starship, but re-working that green means 5 and grey means 8 or black means 0 and blue means 5 just gets tedious this time around – much better to have just given us a six digit number because then it is much clearer what is happening as you move around the 3,000,000 "rooms" in the transport system.

I think Pete Austin was aware that asking us to find our colour coded way to five different locations is somewhat repetitive, so the hint sheet actually provides a program to do this for you.

Even then I still find the system confusing, particularly when going north 13 times always seems to get you back where you started.

On top of that I find the roundabouts are "trapdoors" that you can get on to them but cannot easily go back, so they are difficult to visualise or map and I think many players will give up at this stage.

To help such players, enter SAY HOME whenever you are lost and you can, at least, explore your habihome (and avoid the curfew) although SAY BED AND LIE ON IT has a peculiar response. SAY ON is also very useful.

Although the parser is greatly improved, I am frustrated that INSERT is not the opposite of REMOVE – you have to PUT THE x IN THE y – and note that on meeting a CUSTODIAN early on, EXAM CUST gets a little confused.

With the help of the hint sheet I have explored most of the game and it's big with plenty of puzzles, but I find it a slight disappointment.

Let me hasten to add that it is far

superior to 90 per cent of the other games on the market, but the Austins have always set high standards of wit and originality and I was hoping that they, like Jonathan Swift in Gulliver's Travels, could introduce a genuine satirical commentary into the adventure art form.

I am sure this is possible, but for the time being we shall have to be content with the rather unsubtle humour of Adrian Mole and Terrormolinos.

Sorry to be so serious, but I'm sure Level 9 can do better than this. If not then the magic begins to go away.

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QUICKSORT

KEN CRAIG

bursts the bubblesort myth that any other sort is too complicated

WITH articles on sorting appearing almost every month in one or other of the computer magazines, the reader may well ask what remains to be said on the subject.

Unfortunately, there is very little information available on sorting techniques other than the bubblesort. This appears to stem from the impression – mistaken, as I hope to show – that more-efficient sorting algorithms are either too difficult to understand or more difficult to implement.

In this article the quicksort is explained and shown to be no more complex than the bubblesort. This is made possible because of the powerful recursive procedure definitions available in BBC Basic.

Before describing the quicksort, it is worthwhile saying why we would want to use an alternative to the bubblesort.

It is well known that the computational time required to sort a list of N items using a bubblesort algorithm is proportional to N*N. The explanation of this will not be repeated here, but a short bubblesort routine is given in Program I for comparison with the quicksort routine.

What is perhaps less well known is that there is a class of sorting algorithms whose computational time is proportional to N*log(N) – the quicksort is of this type.

Since for large N, log(N) is very much smaller than N, these algorithms can be impressively faster than the bubblesort. Further, the larger the list to be sorted, the greater is the gain.

To quote from Donald E. Knuth's book The Art of Computer Programming – recommended for information on all aspects of numerical computation – "the bubblesort has no apparent redeeming features, since there is always a better way to do what it does", while the "quicksort is probably the most useful general purpose technique for internal sorting".

How then does the quicksort work? Consider the list of integers on the first line of Figure I.

The leftmost integer (34) is ringed and is referred to as the "key" item. The key is compared with each number in turn, working in from the right-hand side, until an item is found that is smaller than the key. Thus we pass over 40 and 51 to reach 12, which is smaller than 34.

These items are swapped over, as shown in the second line. The key – still 34 – is now compared with each item in turn, this time working in from the left-hand side, until an item is found that is larger than the key, and these are then swapped. The third line shows the result after swapping 34 and 58.

We continue in this manner alternately looking for items smaller than the key to the right and larger than the key to the left – each time starting from where we last left off – until we have compared the key with all the items. The final result is shown on the bottom line.

The important thing to notice about this method is that the key has now divided the items in the list into two sets: all the items to the right of the key are larger than it and all the items to the left of the key are smaller than it.

The key is thus in its final sorted position and need be considered no further. Also, the two sets of integers on either side of the key can now be sorted independently of each other.

This is a very substantial gain, as is easily shown. Let us assume that the original set of N items took, say, 20 seconds to sort using the bubblesort. After the above procedure, the problem has been broken down into two half-sized problems.

However, because of the N*N time dependence of the bubblesort, each of these problems will take not 10 but five seconds to solve. So, at the minor expense of an initial partitioning

(34)	23	18	58	27	63	36	12	51	40
12	23	18	58	27	63	36	(34)	51	40
12	23	18	(34)	27	63	36	58	51	40
12	23	18	27	(34)	63	36	58	51	40

Figure I

```
   10 REM Basic Bubble & quick sort
   15 REM (c) The Micro User
   20 MODE7:@%=12:DIM A%(5000)
   30 REPEAT
   40 INPUT"Number of items to sort (
1-5000)",N: IF N>5000 GOTO 40
   50 SEED=ABS(RND)
   60 FOR TYPE=1 TO 2
   70 X=RND(-SEED)
   80 FOR I=1 TO N: A%(I)=RND: NEXT
   90 T=TIME
  100 IF TYPE=1 THEN PROCquicksort(1,
N) ELSE PROCbubblesort(1,N)
  110 T=(TIME-T)/100
  120 FOR I=1 TO N: PRINT A%(I): NEXT
  130 PRINT "TIME FOR ";
  140 IF TYPE=1 THEN PRINT "QUICK ";
ELSE PRINT "BUBBLE ";
  150 PRINT "SORT WAS ";T;" SECS"
  160 NEXT TYPE
  170 UNTIL FALSE
  180 END
 1000 DEF PROCbubblesort(IL%,IH%)
 1010 IF IH% <= IL% THEN ENDPROC
 1020 FOR J%=IH%-1 TO IL% STEP -1
 1030 FOR I%=IL% TO J%
 1040 IF A%(I%)>A%(I%+1) THEN T%=A%(I
%):A%(I%)=A%(I%+1):A%(I%+1)=T%
 1050 NEXT I%:NEXT J%
 1060 ENDPROC
 3000 DEF PROCquicksort(IL%,IH%)
 3010 LOCAL L%,H%
 3020 IF IH% <= IL% THEN ENDPROC
 3030 IF IH%>(IL%+1) THEN X%=RND(1+IH
%-IL%)+IL%-1:T%=A%(X%):A%(X%)=A%(IL%)
:A%(IL%)=T%
 3040 K%=A%(IL%):L%=IL%:H%=IH%
 3050 IF L%=H% THEN GOTO 3090
 3060 IF K% <= A%(H%) THEN H%=H%-1:GO
TO 3050 ELSE A%(L%)=A%(H%):A%(H%)=K%:
L%=L%+1
 3070 IF L%=H% THEN GOTO 3090
 3080 IF K% >= A%(L%) THEN L%=L%+1:GO
TO 3070 ELSE A%(H%)=A%(L%):A%(L%)=K%:
H%=H%-1:GOTO 3050
 3090 PROCquicksort(IL%,L%-1)
 3100 PROCquicksort(H%+1,IH%)
 3110 ENDPROC
```

Program 1

process, the sorting time has been halved.

The next thing to realise is that if the partitioning process is so successful, then we should use the same method on the two half-sized problems, reducing them to four quarter-sized problems.

Continuing in this way, the whole set of items will end up in ascending sorted order by this iterative process alone – this is the quicksort algorithm.

This "divide and conquer" philosophy crops up in several areas of computing and it is easy to show that it reduces the computational time of an N*N process to be proportional to N*log(N). The Fast Fourier Transform is another example in which a partitioning technique is used to reduce an N*N algorithm to an N*log(N) one.

In Program I PROCquicksort is a Basic procedure to implement the quicksort algorithm. For simplicity, the items to be sorted are integers in the array *A%(N)*. The two parameters passed to the procedure are the first and last elements of the array to be sorted.

Ignoring for the moment the strange-looking line 3030, the procedure is straightforward. In line 3040, *K%* is given the value of the "key", while *L%* and *H%* act as pointers in the array to the left and right-hand ends, respectively.

Line 3060 works in from the right, comparing the key and swapping if necessary, while line 3080 does the same for items on the left.

When *L% = H%*, the array has been partitioned into two pieces and all that remains is to call PROCquicksort recursively on these two pieces with the appropriate parameters. This is done in lines 3090 for the left-hand piece and 3100 for the right-hand piece.

Two points about the recursive call should be noted. Firstly, line 3020 is required to terminate the recursion when we get down to a single item.

Secondly, line 3010 declares the variables *L%* and *H%* as LOCAL variables. This is necessary as these variables must retain their values across the recursive function calls to be passed as parameters in lines 3090 and 3100. A LOCAL declaration instructs the Basic interpreter to do just this.

The test routine in lines 10-180 allows a comparison of bubblesort and quicksort times.

Each time round the REPEAT . . . UNTIL loop a random set of integers is generated in the array *A%(N)*.

In order to compare the two sorts on the same set of data, a random seed is generated in line 50 and used to initialise the random number generator to the same pseudo random sequence in line 70.

If the program is run for various values of *N*, a table can be drawn up showing the comparative speeds of the two methods. This has been done in Table I.

As an example, the bubblesort takes half an hour to sort 1000 integers while the quicksort takes under a minute.

One criticism sometimes aimed at the quicksort is that it is very inefficient for small *N*. Table I shows that the quicksort is indeed marginally slower for $N = 10$ – but is still pretty fast – but for $N > 20$ it wins over the bubblesort.

Now for that mysterious line 3030. Why do we need a RND function in the middle of the sort routine? To illustrate why, delete line 3030 and change line 80 to:

```
80 FOR I=1 TO N:A%(I)=I:NEXT
```

This sets up the array *A%(N)* so that it is already sorted correctly before we call the sort routines.

If the program is now run for $N=100$, say, we find that the quicksort takes almost as long as the bubblesort. This shows up a rather curious fact about the quicksort – although the execution time is proportional to *N*log(N)* for an initially random array, the time taken to sort an already sorted array is proportional to *N*N*.

This worst case performance of the quicksort would be a serious drawback in practice if there were no solution to the problem. This is because most lists to be sorted in practical situations are far from random.

A typical situation would be where a

Number of items	Basic Bubble	Basic Quick	Assembler Bubble	Assembler Quick
10	0.19	0.25	0.0	0.01
20	0.75	0.57	0.03	0.01
50	4.7	1.7	0.12	0.04
100	19	4.0	0.49	0.08
200	74	8.8	2.0	0.18
500	8 mins	25	12	0.48
1000	31 mins	56	49	1.1
2000	2 hrs	2.1 mins	3.3 mins	2.3
5000	13 hrs	5.8 mins	20 mins	6.3

Table I – Time in seconds unless stated otherwise

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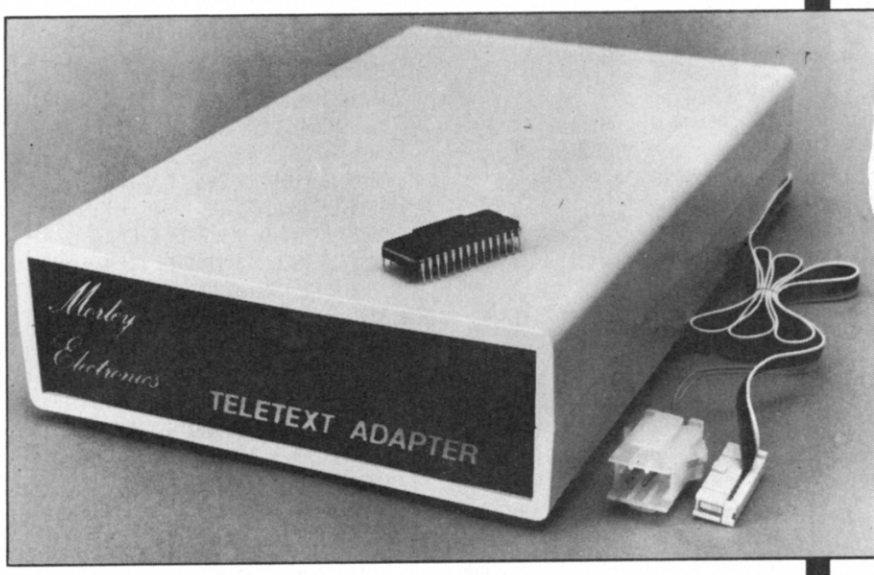

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From Page 125

list of 100 previously-sorted names had 10 new names added to it. Using the quicksort to reorder the names would be slow for the above reason.

Fortunately there is a simple solution to this problem. Rather than making the left-hand item the "key", we choose an item at random and swap this with the left-hand one before we start. Line 3030 does this. Running the program with line 3030 reinstated will now produce a fast sort.

This leads to the rather paradoxical result that in order to sort an already ordered set of items it is faster to jumble them up first.

It is important to realise that there is still some particular ordering that will give the worst case performance.

What we have done is to change that particular ordering from one that we are likely to encounter in practice to one that is extremely unlikely – and since there is a random element involved, that particular ordering will be different each time we run the procedure.

Finally in Program II I give an assembly language version of the quicksort for integer arrays. The calling sequence is more general than for the Basic procedure, being:

```
CALL QUICKSORT,array%(i%),n%
```

where *array%* is any integer array and the routine will sort *n%* elements starting at *i%*.

One complication is the necessary saving and restoring of pointers for the recursive procedure calls which are hidden from us in Basic. Although the hardware stack could have been used for this, I have employed a software stack for generality.

Also, instead of using a random "shuffle" to avoid the worst case performance, I have employed a simpler procedure that is sufficient for most applications.

The operation of the procedure is outline below. *OLP* and *OHP* are pointers to the left and right-hand limits of the current sort partition, while *LP* and *HP* point to the current left and right-hand items being compared with the key.

The final column of Table I shows what happens when Program II is run. The sort is now so fast that most of the time is taken up generating the random numbers and printing out the sorted

> **"In order to sort an already ordered set of items it is faster to jumble them up first"**

array. Line 120 should be deleted once the reader is convinced that the routine works. 5,000 integers are sorted in about six seconds.

In Table I, I have also included times for an assembly language bubblesort – given in Ian Birnbaum's book Assembly Language Programming for the BBC Microcomputer. It is interesting to note that for large lists, even the Basic quicksort is faster than the machine code bubblesort.

I have tried to show that there is nothing difficult in using more efficient sorting methods than the bubblesort. The programs given here could be extended to cover string or real arrays without much difficulty. So the next time you need to do a bit of sorting, make it a quick sort with a quicksort.

PROGRAM STRUCTURE

270-370	Check parameters for number and type.
380-550	Initialise OLP and OHP.
560-660	Initialise LP and HP and check for equality, in which case pop the stack.
670	Calls the "shuffle" routine.
680-710	Save the "key" value.
720-890	Compare the key with items to the right and swap if greater.
900-1070	Compare the key with items to the left and swap if smaller.
1080-1120	Store back the key.
1130-1220	It turns out that the most effective use of the stack occurs if, once the data has been partitioned, we operate next on the smaller partition and store pointers to the larger partition on the stack; these lines accomplish this.
1230-1390	Push pointers on to stack.
1400-1550	Pop pointers off the stack.
1560-1700	Do the simple shuffle – the left hand and middle items are swapped.

Program 11

```
  10 REM Machine code Quicksort
  15 REM (c) The Micro User
  20 MODE7:@%=12:DIM A%(5000)
  30 PROCinit
  40 REPEAT
  50 INPUT"Number of items to sort "
,NN%: IF NN%>5000 GOTO 50
  60 FOR I%=1 TO NN%: A%(I%)=RND: NE
XT
  70 PRINT "Beginning sort ..."
  80 time%=TIME
  90 CALL QUICKSORT,A%(1),NN%
 100 time%=TIME-time%
 110 PRINT "Sort complete. Time take
n = ";time%/100;" secs"
 120 FOR I%=1 TO NN%: PRINT A%(I%):
NEXT
```

Turn to Page 136

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- ★ Display low memory areas.
- ★ Load menu.
- ★ Switch NFS off.
- ★ Manipulate read/write on ROM 15.
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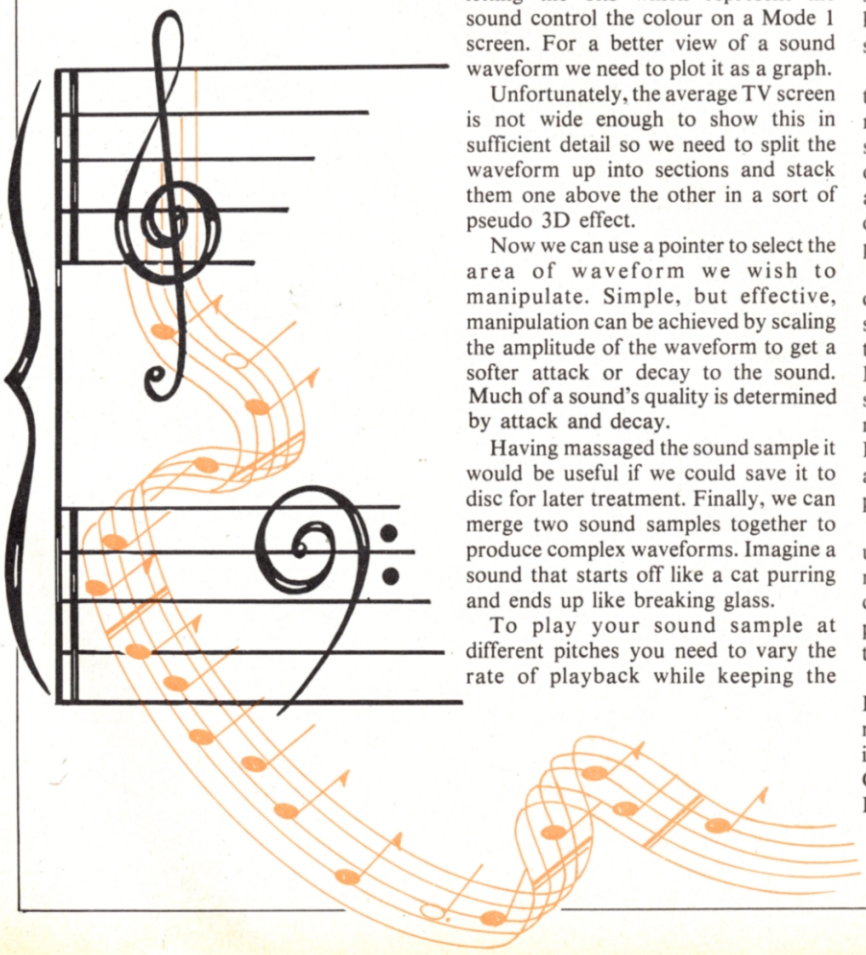
After processing sound in real time, MIKE COOK goes one step further in Part 36 of his course and advises . . .

Mash a waveform and play a tune

LAST month we considered how to manipulate sounds in real time. This month, using the Body Building sound sampler (described in the January 1985 issue of *The Micro User*), we will see how we can massage and manipulate a sound sample and even play a tune with it.

Have you seen the advertisement where the crunching of breakfast cereal is manipulated in rhythm and pitch to sound like a train pulling out of the station? Well, that is done using the same sort of techniques I will describe in this article. Bear in mind, however, that the sound sampler used on the advertisement would cheerfully pay off most people's mortgages.

Having sampled a sound what can we do with it? Well, first of all we can be a little selective. It is difficult to press the sample at exactly the right time, so if we sample for longer than necessary we can select the area of sound to use.



The display of the sound we have been using to date resulted from simply letting the bits which represent the sound control the colour on a Mode 1 screen. For a better view of a sound waveform we need to plot it as a graph.

Unfortunately, the average TV screen is not wide enough to show this in sufficient detail so we need to split the waveform up into sections and stack them one above the other in a sort of pseudo 3D effect.

Now we can use a pointer to select the area of waveform we wish to manipulate. Simple, but effective, manipulation can be achieved by scaling the amplitude of the waveform to get a softer attack or decay to the sound. Much of a sound's quality is determined by attack and decay.

Having massaged the sound sample it would be useful if we could save it to disc for later treatment. Finally, we can merge two sound samples together to produce complex waveforms. Imagine a sound that starts off like a cat purring and ends up like breaking glass.

To play your sound sample at different pitches you need to vary the rate of playback while keeping the whole time to output it. The sound sample can then be played from a keyboard or as a tune from data statements.

While there are many ways to achieve these ends I have started you off on the road to sound experimentation with some software, which is this month's offering. You will find it in Programs I and II or, perhaps in a less taxing form, on this month's cassette and disc (see page 175 for the order form).

The BBC Micro is notoriously short of memory so the program has to be split into two parts. This is mainly due to the amount of machine code used. Machine code itself takes up very little space but the assembler source code needed to produce it takes up quite a bit. In fact, if you include comments, it takes about 10 bytes of assembler code to produce one byte of machine code.

As we need the assembler code only until the machine code is generated it makes sense to place all the machine code assembler instructions in one program, and the working gubbins in the other.

In fact that is what I have done here. Program I contains the source for the machine code and the instructions. This is run first and it automatically CHAINs the main program, Program II.

Those of you courageous enough to

→

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type in these programs must call Program II B_MAP, or alternatively change the filename in line 130 of Program I to suit yours.

The machine code is left behind in the serial buffer at &A00 and the user-definable character buffer at &C00 – neither area can be touched by the main program.

In addition, the first program generates a look-up table, places it in memory and adjusts HIMEM so that it is left untouched. Note that when doing this trick all screen mode changes must be done using the VDU22,X method as this will not reset HIMEM.

The program is quite involved but followers of past Body Building articles will recognise some techniques we have used before. For example, the sample acquisition and simple playback is very similar to the system we used for the stutter effect in the January article. Let's go through a sample session and see where the various parts of the software are used.

Assume the program is running and we are faced with the first prompt. If we press the S key we will start to digitise a sample. You will see the screen fill up with dots in the same way as the stutter program, only this time it stops a little short of the bottom of the screen.

We now have 16k of sample but we are only going to use 8k of it. If you look carefully you will see the flashing cursor at the top left hand corner of the screen. You can play the whole 16k back by pressing the Spacebar but if you press the 8 key you will hear 8k of the sample from the point of the flashing cursor.

By using the up and down cursor keys you can move the starting point to anywhere in the first 8k of the sample. In this way you can sneak up on the start of the sound and capture it exactly. Note that the cursor moves in increments of 256 bytes for simplicity.

When you have the 8k of sample you want, you can press the P key to plot out the waveform. The sample is first moved to the start of the buffer and then the screen is changed to Mode 4. As HIMEM is not changed, the 8k we want is sitting above the screen memory. We can therefore plot our sound sample and still have the values intact.

If we used the PLOT commands of Basic or the equivalent machine code calls, the plotting would take far too long. Instead we must be a little naughty and plot directly to the memory. Here I am using a modified technique that was first used in the Body Building oscilloscope display (March 1984).

The address of the first byte in each row of the display is placed into a look-up table. This means that to plot a point we simply move along adding the X distance to the result we looked up. This then tells us the address to write to. In fact the address changes only every eight dots and the intermediate positions are given by a rotating bit mask.

As we are plotting 32 waveforms there is a waveform number to add to the value in the sound sample so that they appear stacked. If you look at Figure I you will see the waveform of me saying "Hello".

Note that we also let the waveforms overlap – this is partly for the pleasing 3D effect it imparts but mainly to fit them on. Unfortunately a side effect of this is that the first waveform can wrap around and have its peaks displayed at the bottom.

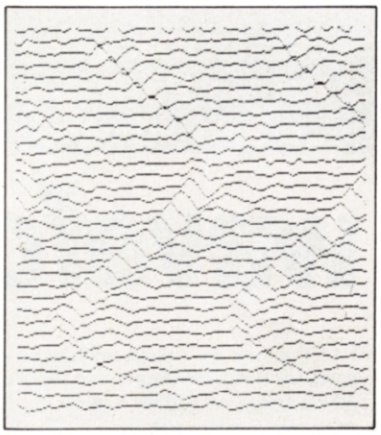

Figure I: Graphical waveform produced by the word HELLO

When the waveform is plotted there will be an arrow pointing at the first section. This pointer indicates the section we are going to work on and it can be moved by using the cursor keys. Pressing the C key will clear this section of the waveform and it will be redrawn to show its new state.

By pressing the F key we can take a fraction of the waveform. By entering a number less than one we will reduce the overall amplitude of the waveform section. If a number greater than one is used the waveform will be scaled up.

But beware. If the new amplitude exceeds the size that can be held in a byte it gets pegged at the maximum level. If you attempt to scale up too much you will turn all your sine waves into square waves. Remember you can hear the results of your manipulation at any time by pressing the Spacebar or 8 key.

If you press the M key you will mark a section of the waveform. This is shown by an M being placed against that section. Now move the pointer on to some new section and press the V key, for vary. This will allow you to scale various waveform sections at one time. All right, V isn't so good, but I was running out of meaningful keys.

You will be asked for the scaling fraction at the marked position and also the fraction for the current position. All waveform sections between the two will be scaled at a rate determined by the two fractions and the waveforms position. As the prompt for the fractions appears next to the waveform section in question the prompt may be off the screen if you are modifying a section next to the bottom of the screen.

To give a sound a soft attack, mark the first waveform section and move about 10 sections into the sample. Then press U and enter a mark fraction of 0 and a pointer fraction of 1. This will then modify the sound sample to start slowly. Press the Spacebar and see, or rather hear. The same can be done at the end of the sound sample to make the sound tail away.

You might then want to save the sound sample on disc. To do this press D for dump and you will be asked for a filename. Note that the program adds an "S." in front of the filename so you can keep your samples in a separate directory. Similarly you can use the L key to load a sound sample. Again the program adds the "S." to the filename.

Having saved a few sounds you might

PROBLEM

COULD you please tell me what undocumented 6502 op-codes are? – Mark Briggs, Loughborough.

SOLVED

They are code values not listed as doing anything. Try them and see what they do on your processor. They are likely to do part operations like setting flags under certain conditions – nothing very exciting.

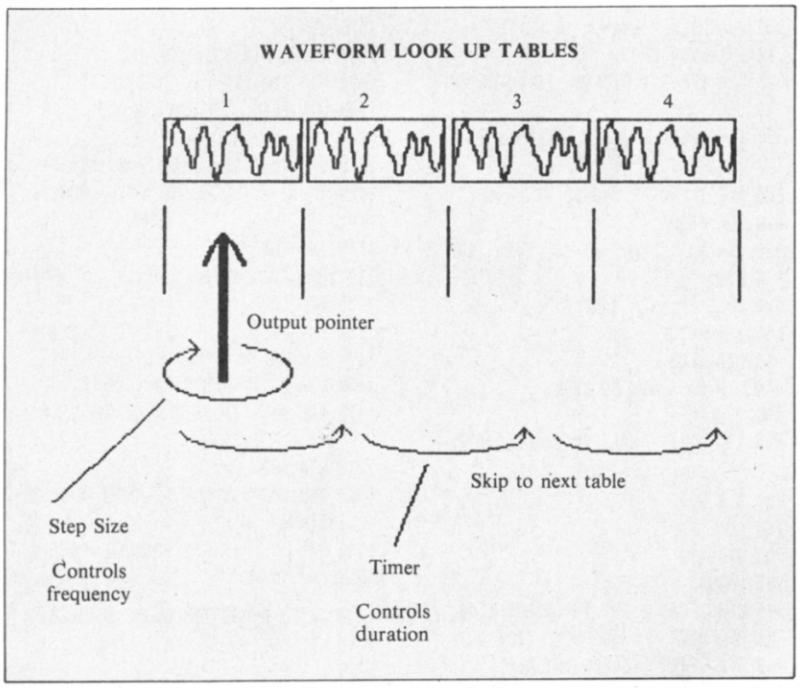

Figure II: Production of note

like to hear what they sound like when they are mixed together. By using the J key you can join a sound sample stored on disc to the one currently being worked on. This is done by loading the stored sample over the area being used for the screen and having a machine code program add them together.

Before they are added each sample is halved so that the maximum sample size is not exceeded. It is even possible to use this command immediately after sampling, in which case the second 8k of the sample is added to the first 8k.

Having mashed the waveform around something shocking it is interesting to play it back in the form of a tune. The T key will do this. The data statements at the end of the program play Frère Jacques. The notation is quite simple. The O number sets an octave for the notes which follow it, while the notes themselves are represented by note and value pairs with upper and lower case distinguishing between sharps and naturals.

If a tune is not to your liking you can play the notes on the keyboard by pressing the K key. The notes are all of fixed length determined in line 1700 and each is produced by stepping through 256 bytes in a circular fashion at a fixed time interval.

However the next sample to output is calculated by adding a fractional value to the current output pointer. When the pointer loops around, timer T2 is tested to see if it has timed out. If it has the next 256 bytes of the sample are used, and this continues until all the sample has been used.

Thus the setting of timer T2 determines the length of the note and the incremental fraction determines the frequency. This is summed up in Figure II.

As T2 is only tested once each time around the loop, if it times out just after it has been tested it will be a comparatively long while before it is looked at again. This results in different frequencies having slightly different lengths, but in practice it is not a disadvantage. Note that if you push a sound a long way from its origin it sounds totally different.

When typing in the listings save the second program under the name of "B_MAP" otherwise the first program will not be able to chain it. If you do change its name then make the appropriate alteration to line 130 in Program I.

I have made no provisions for synthesising sound in the program. This is partly because of lack of room and partly that we have covered it in a past article.

The November 1984 Body Building article had a program that would synthesise a waveform from the envelopes of harmonics. The data files produced by that program can be used with this one. First you have to rename them as they will all have a "T." prefix and this program requires them to have a "S." prefix.

Load them in like any other sound sample. You will find that the first waveform section is a mess so use the clear command on it. This is because the program saved some other data as well as the waveform data. A plot of a scraped string type sound is shown in Figure III. You can even mix these synthesised sounds with your sampled ones, the possibilities are limited only by how much you can stand.

Another processing technique you might like to try to implement is that of filtering. As we are not doing this in real

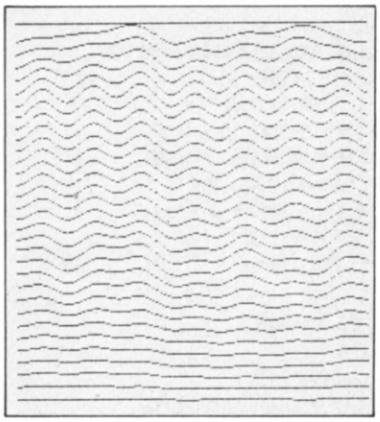

Figure III: Graphical waveform produced by a scraped string

time the speed is unimportant. A low pass filter can be approximated by making each sample the average value of that on either side of it. For a lower frequency filter try using several samples on either side. Finally try weighting the samples depending upon how far away they are from the target sample.

To achieve a high pass filter make the difference between the sample and the average of the samples on each side double what it already is. That is, change the sample so that it is more different from its neighbours – if you will pardon the expression.

● *Well that wraps up the subject of sound sampling, so warm up your soldering irons for next month's constructional project.*

Full listing starts on Page 131

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Program I: File C_MAP

```
 10 MODE1
 20 PRINT"BEEB BODY BUILDING COURSE
 30 PRINT"SOUND SAMPLER"
 40 PRINT"MACHINE CODE INITIALISER"
 50 PRINT"FOR SOUND MANIPULATOR"
 60 PRINT"By Mike Cook"
 70 PRINT
 80 HIMEM=&2E00
 90 LOOK%=&2E00
100 PROC_INT
110 PROC_INT2
120 PROC_INSTRUCTIONS
130 CHAIN"B_MAP"
140 DEF PROC_INT
150 LINK=1
160 BA=&FC00+LINK*32
170 SC=BA+8
180 ?&86=&80:?&80=00:?&81=00
190 M%=LOOK%
200 FOR A%=0 TO 31
210 FOR B%=0 TO 7
220 T%=A%*&140+B%+&5800
230 ?M%=T% MOD 256
240 M%?&100=T% DIV 256
250 M%=M%+1
260 NEXT:NEXT
270 FOR PASS=0 TO 2 STEP 2
280 P%=&A00
290 [
300 OPT PASS
310 .SETUP \ INITIALISE
320 SEI \ DISABLE INTERRUPTS
330 STA SC
340 LDA #&40
350 LDY #0
360 STA &FE6B \ ENABLE TIMER 1
370 LDA #&C0
380 STA &FE6E \ ENABLE INTERRUPT
390 LDA #0
400 STA &FE65 \ START IT OFF
410 RTS
420 .G% \ GET SAMPLE INTO MEMORY
430 JSR SETUP
440 .HOLD
450 LDA &FE6D \ GET INTERRUPT FLAG
460 BPL HOLD \ LOOP UNTIL TIME OUT
470 STA &FE6D \ CLEAR INTERRUPT
480 LDA BA \ GET SAMPLE
490 STA SC \ START GETTING NEXT ONE
500 STA (&70),Y
510 INY
520 BNE HOLD \ GET ANOTHER
530 INC &71 \ INCREASE MS POINTER
540 LDA #&70
550 CMP &71 \ REACHED LIMIT ?
560 BNE HOLD \ BRANCH IF NOT
570 .FIN LDA #&40
580 STA &FE6E \ DISABLE T1 INTERRUP
T
590 STA &FE6D \ CLEAR ANY INTERRUPT
S
600 CLI \ ENABLE SYSTEM INTERRUPTS
610 LDA #&80
620 STA BA \ LEAVE AT DC LEVEL ZERO
630 RTS
640 .U% \ PLAY A SAMPLE
650 JSR SETUP
660 LDA #&80
670 STA BA \ SET DC LEVEL
680 .PAUSE
690 LDA &72 \ TRANSFER START ADDRES
S
700 STA &70
710 LDA &73
720 STA &71
730 .HOUT
740 LDA &FE6D \ GET INTERRUPT FLAG
750 BPL HOUT \ LOOP UNTIL TIME OUT
760 STA &FE6D \ CLEAR INTERRUPT
770 LDA (&70),Y \ GET A SAMPLE
780 STA BA \ OUTPUT IT
790 INY
800 BNE HOUT \ GET ANOTHER
810 INC &71 \ INCREASE MS POINTER
820 LDA &80
830 CMP &71 \ REACHED LIMIT ?
840 BNE HOUT \ BRANCH IF NOT
850 JMP FIN
860 \DISPLAY SAMPLES
870 .L% LDX #0
880 STX &87
890 STX &80
900 .LOOP LDY &80
910 LDA (&70),Y  \GET VALUE TO PLOT
920 ROR A \ SCALE IT
930 ROR A
940 ROR A
950 ROR A
960 AND #&F
970 CLC
980 ADC &74 \ POSITION IT
990 TAY
1000 LDA LOOK%,Y  \LOOK UP LSB OF FI
RST COLUMN
1010 CLC
1020 ADC &87     \ADD X VALUE
1030 STA &84     \STORE MSB OF PLOT
ADDRESS
1040 LDA LOOK%+&100,Y  \LOOK UP MSB
OF FIRST COLUMN
1050 ADC #0      \ADD X VALUE
1060 STA &85   \STORE MSB OF PLOT AD
DRESS
1070 LDX #0
1080 \PLOT NEW POINT ON THE SCREEN
1090 LDA (&84,X)    \GET DISPLAY BYTE
1100 ORA &86        \SET APPROPRIATE
BIT
1110 STA (&84,X)    \WRITE TO SCREEN
1120 \MOVE POINTERS TO NEXT X POSITI
ON
1130 INC &80  \X POINTER
1140 ROR &86  \PIXEL MASK
1150 BCC LOOP
1160 LDA #&80       \RESTORE MASK BIT
1170 STA &86
1180 LDA #7   \ADD 8 TO X VALUE
1190 ADC &87 \IT IS 8 AS CARRY IS SE
T
1200 STA &87
1210 BNE LOOP  \LOOP IF NOT FINISHED
 ALL POINTS
1220 RTS        \FINISH WHEN SPACE P
RESSED
1230 .J% \ MERGE TWO SOUND SAMPLES
1240 LDY #0
1250 .LOOP
1260 LDA (&70),Y \ GET SAMPLE OF ONE
 SOUND
1270 CLC
1280 ROR A
1290 STA &74 \ TEMP STORE
1300 LDA (&72),Y \ GET SAMPLE OF OTH
ER SOUND
1310 CLC
1320 ROR A
1330 ADC &74 \ ADD THE TWO
1340 STA (&70),Y \ PUT IT BACK
1350 INY
1360 BNE LOOP \ DO NEXT SAMPLE
1370 INC &71 \ MOVE ON MOST SIG BITS
1380 INC &73 \ OF POINTERS
1390 LDA #&50
1400 CMP &71 \ SEE IF WE HAVE DONE A
LL
1410 BNE LOOP \ BRANCH IF NOT
1420 RTS
1430 ]
1440 NEXT
1450 ENDPROC
1460 DEF PROC_INSTRUCTIONS
1470 CLS
1480 PRINT
1490 PRINT"BEEB BODY BUILDING COURSE
"
1500 PRINT"SOUND SAMPLE MANIPULATOR"
1510 PRINT"MARCH 1986"
1520 PRINT"By Mike Cook"
1530 PRINT
1540 PRINT"Options are:-"
1550 PRINT"S  - Sample input"
```

```
1560 PRINT"sp - Play back sample"
1570 PRINT"8  - Play back 8k of samp
le"
1580 PRINT"R  - Rate of digitising"
1590 PRINT"P  - Plot the waveform"
1600 PRINT"C  - Clear a section of w
aveform"
1610 PRINT"F  - Fraction of waveform
 section"
1620 PRINT"M  - Mark a waveform sect
ion"
1630 PRINT"V  - Vary between pointer
 and mark"
1640 PRINT"L  - Load in a waveform"
1650 PRINT"D  - Dump out a waveform"
1660 PRINT"J  - Join this waveform t
o a stored one"
1670 PRINT"T  - Tune played with sam
ple"
1680 PRINT"K  - Keyboard playing of
sample"
1690 PRINT
1700 PRINT"Use cursor keys to move p
ointer"
1710 PRINT
1720 PRINT"Press any key to load the
 main file"
1730 A$=GET$
1740 ENDPROC
1750 DEF PROC_INT2
1760 ?&78=30
1770 FOR A%=0 TO 2 STEP 2
1780 P%=&C00
1790 [
1800 OPT A%
1810 .Q% \ SYNTHESISE A NOTE
1820 LDX &78 \ SET UP NUMBER OF TABL
ES TO USE
1830 LDA &79 \ SET UP ADDRESS OF
1840 STA &72 \ START OF WAVEFORM TAB
LES
1850 LDA &7A
1860 STA &73
1870 SEI \ DISABLE INTERRUPTS FROM T
HE SYSTEM
1880 LDA #&E0 \ ENABLE THE TWO TIMER
S
1890 STA &FE6E
1900 LDA #&70 \ INITIALISE T1
1910 STA &FE64 \ LOW ORDER COUNT
1920 STA &FE66 \ LOW ORDER LATCH
1930 LDA #0
1940 STA &FE67 \ HIGH ORDER LATCH
1950 STA &FE65 \ START T1 RUNNING
1960 .ST2 \ START T2
1970 LDA #&FF
1980 STA &FE6B
1990 LDA &76 \ VALUE FROM MEMORY
2000 STA &FE69
2010 .HOLD1 \ LOOP UNTIL T1 TIMEOUT
2020 LDA #&40
2030 .HOLD2 BIT &FE6D \ SEE IF T1 IS
READY
2040 BEQ HOLD2
2050 STA &FE6D \CLEAR INTERRUPT FLAG
2060 \ MOVE ON THE ENTRY POINTER
2070 CLC
2080 LDA &74 \ INCREMENT VALUE
2090 ADC &70
2100 STA &70
2110 LDA &75
2120 ADC &71
2130 STA &71
2140 LDY &71 \ NUMBER OF ENTRY TO GE
T
2150 LDA (&72),Y \ GET ENTRY IN TABL
E GIVEN BY &72,&73
2160 STA BA \ OUTPUT IT TO D/A
2170 BCC HOLD1
2180 LDA #&20 \ LOOK FOR T2 TIMEOUT
2190 BIT &FE6D
2200 BEQ HOLD1 \ NEXT ENTRY IF NOT T
IMED OUT
2210 STA &FE6D \ RESET INTERRUPT FLA
G
2220 INC &73 \ MOVE TABLE ONTO THE N
EXT ONE
2230 DEX \ TABLES TO GO VALUE
2240 BNE ST2 \ BACK TO START T2 AGAI
N
2250 LDA #&60 \ DISABLE THE TWO TIME
RS
2260 STA &FE6E
2270 LDA #128 \ SET OUTPUT TO MID PO
INT
2280 STA BA
2290 CLI \ ENABLE SYSTEM INTERRUPTS
2300 RTS
2310 ]
2320 NEXT
2330 ?&79=&00
2340 ?&7A=&30
2350 ENDPROC
```

Program II: File B_MAP

```
10 CLS
20 PRINT"BEEB BODY BUILDING COURSE
"
30 PRINT"SOUND SAMPLE MANIPULATOR"
40 PRINT"MAIN PROGRAM"
50 PRINT"By Mike Cook"
60 PRINT
70 *FX4,1
80 DIM CL% &20,ANOTE% 96
90 octave$="cCdDefFgGaAb":REM CAPS
=# (C=c sharp)
100 PROC_NINT
110 POINT=0
120 CD%=40
130 ?&FE67=0
140 ?&FE66=CD%
150 D%=0 :REM DISPLAY MODE
160 REPEAT
170 IF D%=0 THEN PRINTTAB(0,30);SPC
(38);
180 IF D%=0 THEN PRINTTAB(0,30);"(S
 sp 8 R P)";
190 REPEAT
200 P1%=POINT*16
210 IF D%=0 THEN PRINT TAB(P1% MOD
40,P1% DIV 40); ELSE PLOT0,-32,0:PRIN
T"<";:MOVE 1024,1032-(POINT*32):PRINT
"<";
220 A$=GET$
230 IF D% THEN PLIM%=&1F ELSE PLIM%
=&20
240 IF A$=CHR$(138) THEN POINT=POIN
T+1:IF POINT>PLIM% THEN POINT=0
250 IF A$=CHR$(139) THEN POINT=POIN
T-1:IF POINT<0 THEN POINT=PLIM%
260 UNTIL NOT(A$=";" OR A$="-")
270 IF D%=0 THEN ?&80=POINT+&50:?&7
3=POINT+&30 ELSE ?&80=&50:?&73=&30
280 IF A$="9" THEN M%=-1:VDU22,1:VD
U4:D%=0:POINT=0:?&70=00:?&71=&30:CALL
 GX
290 IF A$=" " AND D%=1 THEN A$="8"
300 IF A$=" " AND D%=0 THEN ?&72=00
:?&73=&30:?&80=&70:CALL UX
310 IF A$="8" THEN ?&72=00:CALL UX
320 IF A$="R" THEN PROC_RATE
330 IF A$="P" AND D%=0 THEN PROC_AD
JUST:VDU22,4:VDU5:PROC_PLOT
340 IF A$="C" AND D%=1 THEN PROC_SC
ALE(0,POINT):PROC_PLOT
350 IF A$="F" AND D%=1 THEN PROC_FR
ACTION:PROC_SCALE(F,POINT):PROC_PLOT
360 IF A$="M" AND D%=1 THEN PRINT"M
":PLOT 0,-32,0:M%=POINT
370 IF A$="V" AND D%=1 THEN PROC_FA
DE:PROC_PLOT
380 IF A$="D" AND D%=1 THEN PROC_FD
UMP:PROC_PLOT
390 IF A$="L" THEN VDU22,4:VDU5:D%=
1:PROC_FLOAD:PROC_PLOT
400 IF A$="J" AND D%=1 THEN PROC_ME
RGE:PROC_PLOT
410 IF A$="J" AND D%=0 THEN PROC_JO
IN
420 IF A$="T" AND D%=1 THEN PROC_TU
NE:?&FE66=CD%:PROC_PLOT
```

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```
  430 IF A$="K" AND D%=1 THEN PROC_PL
AY:?&FE66=CD%:PROC_PLOT
  440 UNTIL FALSE
  450 DEF PROC_FLOAD
  460 PROC_GNAME("LOADING SOUND")
  470 PROC_CLI("LOAD "," 3000")
  480 ENDPROC
  490 DEF PROC_MERGE
  500 PROC_GNAME("JOINING SOUND")
  510 PROC_CLI("LOAD "," 5000")
  520 PROC_JOIN
  530 ENDPROC
  540 DEF PROC_JOIN
  550 ?&70=0
  560 ?&71=&30
  570 ?&72=0
  580 ?&73=&50
  590 CALL J%
  600 ENDPROC
  610 DEF PROC_FDUMP
  620 PROC_GNAME("SAVING SOUND")
  630 PROC_CLI("SAVE "," 3000 5000")
  640 ENDPROC
  650 DEF PROC_GNAME(P$)
  660 CLG
  670 MOVE 0,1000
  680 PRINTP$;" FILE NAME ";
  690 INPUT F$
  700 ENDPROC
  710 DEF PROC_CLI(P1$,P2$)
  720 $CL%=P1$+"S."+F$+P2$
  730 X%=CL% MOD 256
  740 Y%=CL% DIV 256
  750 CALL &FFF7
  760 ENDPROC
  770 DEF PROC_FADE
  780 IF M%<0 OR POINT=M% THEN ENDPRO
C
  790 MOVE 1100,1032-(M%*32)
  800 PRINT"Mark";
  810 PLOT 0,-128,-64
  820 INPUT MF
  830 MOVE 1048,1032-(POINT*32)
  840 PRINT"Pointer";
  850 PLOT 0,-224,-64
  860 INPUT F
  870 IF M%>POINT THEN F%=POINT:T%=M%
:EF=MF:SF=F ELSE T%=POINT:F%=M%:EF=F:
SF=MF
  880 F=(SF-EF)/(T%-F%)
  890 IF SF>EF THEN F=-F
  900 CLG
  910 MOVE 0,1000
  920 PRINT"CALCULATING ";T%-F%;" NEW
 LINES "
  930 PRINTF%;" TO ";T%
  940 PRINT"WORKED OUT LINE :- ";
  950 FOR E%=F% TO T%
  960 PROC_SCALE(SF,E%)
  970 PRINTE%;" ";
  980 SF=SF+F
  990 NEXT
 1000 ENDPROC
 1010 DEF PROC_FRACTION
 1020 MOVE 1024,836
 1030 PRINT"FRACTION"
 1040 MOVE 1030,772
 1050 INPUT F
 1060 ENDPROC
 1070 DEF PROC_SCALE(S,POINT)
 1080 FOR A%=POINT*256+&3000 TO (POIN
T+1)*256+&3000
 1090 B%=(?A%-&80)*S+&80
 1100 IF B%>&100 THEN B%=&FF
 1110 IF B%<0 THEN B%=0
 1120 ?A%=B%
 1130 NEXT
 1140 ENDPROC
 1150 DEF PROC_ADJUST
 1160 IF POINT=0 THEN ENDPROC
 1170 OS%=POINT*256
 1180 FOR A%=&3000 TO &5000 STEP 4
 1190 !A%=!(A%+OS%)
 1200 NEXT
 1210 POINT=0
 1220 ENDPROC
 1230 DEF PROC_RATE
 1240 IF D%=0 THEN PRINT TAB(0,30); E
LSE MOVE 0,500
 1250 PRINT"DELAY ";CD%;" INPUT NEW V
ALUE ";
 1260 INPUT CD%
 1270 ?&FE66=CD%
 1280 IF D%=1 THEN PROC_PLOT
 1290 ENDPROC
 1300 DEF PROC_PLOT
 1310 CLG
 1320 D%=1
 1330 ?&70=&00:?&71=&2F
 1340 FOR A=0 TO 31
 1350 ?&74=(A-1)*8
 1360 ?&71=?&71+1
 1370 CALL L%
 1380 NEXT
 1390 GCOL 3,1
 1400 PLOT 0,-32,0
 1410 PRINT"<";
 1420 ENDPROC
 1430 DEF PROC_NINT
 1440 LOCAL F,FI,R
 1450 FOR C%=1 TO 4
 1460 RESTORE 1600
 1470 FOR A%=ANOTE%+(C%-1)*24 TO ANOT
E%+(C%-1)*24+22 STEP 2
 1480 READ F
 1490 IF C%<>2 THEN F=F*2^(C%-2)
 1500 FI=F*256*50E-6
 1510 ?A%=INT(FI)
 1520 T%=0
 1530 R=FI-INT(FI)
 1540 FOR B%=1 TO 8
 1550 IF R>2^-B% THEN R=R-2^-B%:T%=T%
+2^(8-B%)
 1560 NEXT
 1570 A%?1=T%
 1580 NEXT
 1590 NEXT
```

PROBLEM

I BOUGHT a Microware DDFS and after installing it could not get it to work. When I boot the drive, the drive comes on, the prompt disappears from the screen and the cursor continues to flash.

After a few seconds, the drive switches off, but control is not returned to the keyboard. The same symptom is evident when I try to format a disc. Originally I thought the DDFS was faulty and returned it to Microware. They sent me another one, but I still get the same fault symptom. – R. Banham, JS5S, HQ BFHK, BFPO 1.

SOLVED

This problem sounds as though the non-maskable interrupt is not being generated. This could happen if link S9 has not been cut. This is located half way up the left-hand side of the board.

There are also lots of other possible causes, like bad connections and faulty sockets. I am afraid that without examination of your computer with test equipment it is impossible to narrow it down further.

```
1600 DATA 261.6256,277.18,293.6648,3
11.13
1610 DATA 329.6276,349.2282,369.99,3
91.9954
1620 DATA 415.31,440.000,456.16,493.
8833
1630 ENDPROC
1640 DEF PROC_PLAY
1650 CLS
1660 PRINT TAB(0,8);"Play the keyboa
rd"
1670 PRINT"SPACE changes the octave"
1680 PRINT TAB(0,12);"RETURN key to
end"
1690 L$="AWSEDFTGYHUJKOLP;:[]"
1700 ?&76=&30
1710 P%=0
1720 REPEAT
1730 X$=GET$
1740 A%=INSTR(L$,X$)
1750 IF A%=0 THEN 1800
1760 A%=(A%-1+P%)*2
1770 ?&74=ANOTE%?(A%+1)
1780 ?&75=ANOTE%?A%
1790 CALL &C00
1800 IF X$=" " THEN P%=P%+12: PRINT
TAB(0,10);"OCTIVE ";(P%/12)+1
1810 IF P%=48 THEN P%=-12:GOTO 1800
1820 UNTIL X$=CHR$13
1830 ENDPROC
1840 DEF PROC_SOUND(F%,L%)
1850 K%=2*((F%-1)DIV4)-2
1860 IF K%>193 THEN ENDPROC
1870 ?&74=ANOTE%?(K%+1)
1880 ?&75=ANOTE%?K%
1890 ?&76=L%*16
1900 CALL &C00
1910 ENDPROC
1920 DEFPROC_TUNE
1930 RESTORE 2090
1940 Q%=0
1950 READ N$
1960 IF N$="END" THEN ENDPROC
1970 IF N$="P" THEN PROC_PAUSE:GOTO
1950
1980 IF LEFT$(N$,1)="O" THEN Q%=VAL(
RIGHT$(N$,1)):GOTO1950
1990 T%=VAL(RIGHT$(N$,1))
2000 A$=LEFT$(N$,1)
2010 F%=INSTR(octave$,A$)*4+1+48*(Q%
-1)
2020 PROC_SOUND(F%,T%)
2030 GOTO1950
2040 DEF PROC_PAUSE
2050 TIME=0
2060 REPEAT:UNTIL TIME>5
2070 ENDPROC
2080 REM * FRERE JACQUES *
2090 DATA O1,f2,g2,a2,f2,P,f2,g2,a2,
f2,P
2100 DATA a2,A2,O2,c6,P,O1,a2,A2,O2,
c6,P,P
2110 DATA c1,d1,c1,O1,A1,a3,f3,P,P
2120 DATA O2,c1,d1,c1,O1,A1,a3,f3,P,
P
2130 DATA f2,c2,f4,P,f2,c2,f4
2140 DATA END
```

This listing is included in this month's cassette tape offer. See order form on Page 175.

In the field of TAPE to DISC transfer we don't need to blow our own trumpet!

These comments from some of our customers will be enough to convince BBC 'B' disc users that the REPLAY System is worth more than a second look.

"Congratulations on REPLAY, it works magnificently"
B.B. Southampton.
"an excellent product at a reasonable price".
D.K.A., Cheshire.
"I am very, very impressed by the power of the ROM, and the ease of use it gives".
"I find the REPLAY ROM to be a must for anybody who takes computer games seriously".
D.R., Hereford.
"the REPLAY ROM is a remarkable facility".
A.J.P., London.
"I was pleased with the T.D. ROM but REPLAY is terrific".
V.M. Kent.
"All my tapes have been effortlessly transferred to disc and work well; the pause and update facilities are excellent".
T.G.B., Cheshire.
"Congratulations on a superb product. For my book it's the best utility I've seen for the 'Beeb' ".
C.E., Liverpool.
"we have transferred over 60 cassettes with no problem at all even though we were completely new to disc-drive methods".
W.B., Bolton.
"a marvellous addition to my system".
P.B., Ashford, Kent.
– **and to anyone wondering about our service, may we add the following:**
"If only other firms were so efficient!!"
Lt. Cdr. M.W., Middlesex.
"Your service will not be forgotten".
D.H.C., Derby.

REPLAY FACT FILE

REPLAY is a Hardware/ROM-based system, the unit can be easily installed without soldering, though if you have a ROM expansion board Make sure that the REPLAY ROM can be fitted into one of the computer's own sideways ROM sockets.

With REPLAY installed games can be stopped and saved directly to disc at any time.

REPLAY can load back a stopped screen from disc ready for printing out with a suitable 'printer dump' routine.

Liven up your games with REPLAY: Different background colours: Infinite lives: Hyperspeed: Extra gears: Edit the improvements working from the data sheet supplied.

REPLAY can 'pause' games which do not have this facility built-in, and is also able to offer most disc to disc transfer.

The REPLAY System is intended to provide a facility for individual users, resulting discs are not recognised by a different computer.

Further details and copies of reviews can be supplied on request.

REPLAY is available for the BBC 'B' with O.S.1.20 and fitted with the following DFSs (State type when ordering).

R8271 Acorn and 8271 S/D. R8272 U.D.M. DFS
R8877 Cumana QFS. R2791 Opus 3.15
R2793 Opus 3.35 R1770C Opus Challenger 3.
R1770 Opus 3.45 and Solidisk (not latest 2.2 version).

Versions for the Acorn 1770 DFS, the BBC 'B+' and Solidisk 2.2 are in preparation, further versions will follow.

Available by post from:
VINE MICROS,
MARSHBOROUGH, NR. SANDWICH, KENT CT13 0PG.
Telephone: 0304 812276
or through your local dealer.

REPLAY by Vine Micros

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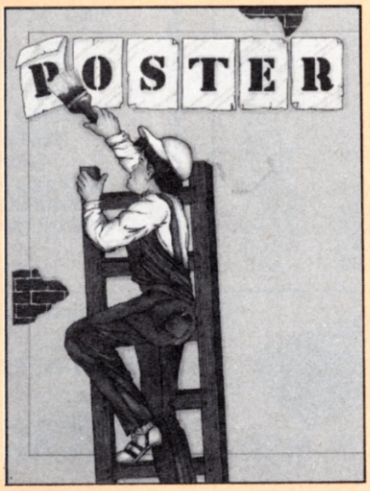
```
  130 UNTIL FALSE
  140 END
  200 DEF PROCinit
  210 DIM PROG% 500,STACK 63,KEY 3,TE
MP1 1,TEMP2 1
  220 PARS=&600:    REM Parameter blo
ck
  230 OLP=&70:OHP=&72:LP=&74:HP=&76:S
P=&78:MID=&7A
  240 FOR C=0 TO 2 STEP 2
  250 P%=PROG%
  260 [OPT C
  270 .QUICKSORT LDA PARS
  280 CMP #2: BEQ PARCHK
  290 .PARERR BRK
  300 ]
  310 ?P%=45
  320 $(P%+1)="Bad parameters"
  330 P%=P%+15
  340 [OPT C: BRK
  350 .PARCHK LDA #4
  360 CMP PARS+3: BNE PARERR
  370 CMP PARS+6: BNE PARERR
  380 LDA #STACK MOD 256: STA SP
  390 LDA #STACK DIV 256: STA SP+1
  400 LDA PARS+4: STA OLP
  410 LDA PARS+5: STA OLP+1
  420 LDY #1
  430 .INIT1
  440 LDA (OLP),Y: STA LP,Y
  450 DEY: BPL INIT1
  460 LDY #2
  470 .INIT2
  480 ASL LP: ROL LP+1
  490 DEY: BNE INIT2
  500 CLC
  510 LDA PARS+1: ADC LP: STA OHP
  520 LDA PARS+2: ADC LP+1: STA OHP+1
  530 SEC
  540 LDA PARS+1: SBC #4: STA OLP
  550 LDA PARS+2: SBC #0: STA OLP+1
  560 .SAVKEY
  570 CLC
  580 LDA OLP: ADC #4: STA LP
  590 LDA OLP+1: ADC #0: STA LP+1
  600 SEC
  610 LDA OHP: STA HP
  620 SBC LP: BNE SAVK1
  630 LDA OHP+1: SBC LP+1: BNE SAVK1
  640 JMP POP
  650 .SAVK1
  660 LDA OHP+1: STA HP+1
  670 JSR SHUFFLE
  680 LDY #3
  690 .SAVK2
  700 LDA (LP),Y: STA KEY,Y
  710 DEY: BPL SAVK2
  720 .CMPHI
  730 SEC
  740 LDA HP: SBC #4: STA HP
  750 BCS CMPHI0: DEC HP+1
  760 .CMPHI0
  770 LDA LP+1: CMP HP+1: BCC CMPHI1
  780 LDA LP: CMP HP: BEQ STORE
  790 .CMPHI1
  800 LDX #4: LDY #0: SEC
  810 .CMPHI2
  820 LDA (HP),Y: SBC KEY,Y: INY
  830 DEX: BNE CMPHI2
  840 BVC NOOVHI: EOR #&80
  850 .NOOVHI
  860 AND #&FF: BPL CMPHI: DEY
  870 .SWAPHI
  880 LDA (HP),Y: STA (LP),Y
  890 DEY: BPL SWAPHI
  900 .CMPLO
  910 CLC
  920 LDA LP: ADC #4: STA LP
  930 BCC CMPLO0: INC LP+1
  940 .CMPLO0
  950 LDA LP+1: CMP HP+1: BCC CMPLO1
  960 LDA LP: CMP HP: BEQ STORE
  970 .CMPLO1
  980 LDX #4: LDY #0: SEC
  990 .CMPLO2
 1000 LDA KEY,Y: SBC (LP),Y: INY
 1010 DEX: BNE CMPLO2
 1020 BVC NOOVLO: EOR #&80
 1030 .NOOVLO
 1040 AND #&FF: BPL CMPLO: DEY
 1050 .SWAPLO
 1060 LDA (LP),Y: STA (HP),Y
 1070 DEY: BPL SWAPLO: BMI CMPHI
 1080 .STORE
 1090 LDY #3
 1100 .STORE1
 1110 LDA KEY,Y: STA (LP),Y
 1120 DEY: BPL STORE1
 1130 SEC
 1140 LDA LP: SBC OLP: STA TEMP1
 1150 LDA LP+1: SBC OLP+1: STA TEMP1+
1
 1160 SEC
 1170 LDA OHP: SBC LP: STA TEMP2
 1180 LDA OHP+1: SBC LP+1: STA TEMP2+
1
 1190 SEC
 1200 LDA TEMP1: SBC TEMP2
 1210 LDA TEMP1+1: SBC TEMP2+1
 1220 BCC PUSHHI
 1230 .PUSHLO
 1240 LDY #0: LDA OLP: STA (SP),Y
 1250 INY: LDA OLP+1: STA (SP),Y
 1260 INY: LDA LP: STA (SP),Y: STA OL
P
 1270 INY: LDA LP+1: STA (SP),Y: STA
OLP+1
 1280 CLC: BCC SPINC
 1290 .PUSHHI
 1300 LDY #2: LDA OHP: STA (SP),Y
 1310 INY: LDA OHP+1: STA (SP),Y
 1320 LDY #0: LDA LP: STA (SP),Y: STA
 OHP
 1330 INY: LDA LP+1: STA (SP),Y: STA
OHP+1
 1340 CLC
 1350 .SPINC
 1360 LDA SP: ADC #4: STA SP
 1370 BCC SPINC1: INC SP+1
 1380 .SPINC1
 1390 JMP SAVKEY
 1400 .POP
 1410 SEC: LDA SP
 1420 SBC #STACK MOD 256: BNE POP1
 1430 LDA SP+1
 1440 SBC #STACK DIV 256: BNE POP1
 1450 RTS
 1460 .POP1
 1470 SEC
 1480 LDA SP: SBC #4: STA SP
 1490 BCS POP2: DEC SP+1
 1500 .POP2
 1510 LDY #3
 1520 .POP3
 1530 LDA (SP),Y: STA OLP,Y
 1540 DEY: BPL POP3
 1550 JMP SAVKEY
 1560 .SHUFFLE
 1570 SEC
 1580 LDA HP: SBC LP: AND #&F8: STA M
ID
 1590 LDA HP+1: SBC LP+1: STA MID+1
 1600 LSR MID+1: ROR MID
 1610 CLC
 1620 LDA LP: ADC MID: STA MID
 1630 LDA LP+1: ADC MID+1: STA MID+1
 1640 LDY #3
 1650 .SHUFLP
 1660 LDA (LP),Y: STA TEMP1
 1670 LDA (MID),Y: STA (LP),Y
 1680 LDA TEMP1: STA (MID),Y
 1690 DEY: BPL SHUFLP
 1700 RTS
 1710 ] NEXT
 1720 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 175.

From Page 113

```
  100REM  PUZZLER  by  A. Pratt
  110REM  (c) The Micro User
  120MODE4
  130DIM A$(15),D$(9),list$(5)
  140DIM R%(15),N%(15),C%(16),S%(5)
  150PROCinitialise
  160PROCintroduction
  170PROCchoose
  180MODE5
  190FOR I%=0 TO 14:A$(I%)="*":NEXT
  200A$(15)=" "
  210IF P%<4 PROCfillposter
  220VDU23;8202;0;0;0;
  230VDU19,1,0;0;19,2,0;0;19,3,0;0;
  240MOVE 16,336:PROCbox(3,672)
  250PROCboard(1):VDU19,3,7;0;:PROCst
ory
  260VDU28,0,31,19,22:CLS:VDU26
  270PROCboard(1):PROCjumble:time=TIM
E
  280REPEAT
  290VDU19,1,4;0;19,2,1;0;
  300VDU19,1,1;0;19,2,4;0;
  310UNTIL TIME=time+200
  320VDU19,1,0;0;19,2,0;0;
  330PROCboard(2)
  340VDU19,1,1;0;19,2,4;0;
  350PROCpieces
  360old%=12:new%=old%:count=0:solved
=FALSE
  370COLOUR2:PRINTTAB(13,14)"MOVES:":
COLOUR3:PRINTTAB(15,16);count
  380VDU28,0,31,19,23:PROCinstruct
  390REPEAT:VDU5
  400MOVE (old% MOD 4)*160+80,888-(ol
d% DIV 4)*160:GCOL 3,3:PRINT"+"
  410REPEAT:*FX15,1
  420valid=FALSE:key=GET
  430MOVE (old% MOD 4)*160+80,888-(ol
d% DIV 4)*160:GCOL 3,3:PRINT"+"
  440IF (key=90 OR key=122) AND (old%
 MOD 4)<>0 THEN new%=old%-1:valid=TRU
E
  450IF (key=88 OR key=120) AND (old%
 MOD 4)<>3 THEN new%=old%+1:valid=TRU
E
  460IF (key=42 OR key=58) AND (old%
DIV 4)<>0 THEN new%=old%-4:valid=TRUE
  470IF (key=47 OR key=63) AND (old%
DIV 4)<>3 THEN new%=old%+4:valid=TRUE
  480MOVE (new% MOD 4)*160+80,888-(ne
w% DIV 4)*160:GCOL 3,3:PRINT"+"
  490UNTIL valid
  500PROCwait(15)
  510count=count+1
```




```
  520MOVE (new% MOD 4)*160+40,840-(ne
w% DIV 4)*160:PROCbox(0,150)
  530PROCwait(15)
  540MOVE (old% MOD 4)*160+40,840-(ol
d% DIV 4)*160:PROCbox((N%(new%) AND 2
4)/8,150)
  550A$(old%)=A$(new%):T%=N%(old%):N%
(old%)=N%(new%):N%(new%)=T%
  560MOVE (old% MOD 4)*160+80,928-(ol
d% DIV 4)*160:PRINT A$(old%)
  570PROCwait(15)
  580MOVE 965,335:PROCbox(0,176)
  590MOVE 965,511:PRINT;count
  600VDU4
  610old%=new%:PROCtest
  620UNTIL solved
  630CLS:VDU19,1,9;0;19,2,12;0;19,3,1
1;0;
  640VDU5
  650MOVE 832,447:GCOL0,2:PRINT"SOLVE
D"
  660VDU4:PROCwait(200)
  670PRINT"PETE WISHES TO THANK"'" YO
U   VERY   MUCH"
  680PROCwait(400)
  690MODE4
  700VDU19,0,4;0;
  710PRINTTAB(14,1)"WIZZ KIDS"''TAB(8
)"Name"TAB(19)"Minimum Moves"
  720IF count>=min GOTO 760
  730min=count:J%=0
  740FOR I%=5 TO 1 STEP-1:IF min<=S%(
I%) J%=I%
  750NEXT
  760FOR I%=1 TO 5
  770IF I%=J% PRINT'TAB(7)name$TAB(27
);min
  780PRINT'TAB(7)list$(I%)TAB(27);S%(
I%)
  790NEXT:COLOUR3
  800IF J%=0 PRINT'TAB(7)name$TAB(27)
;min
  810PRINT'''"1  Try to improve your
score ";name$;" ?"
  820PRINT'"2  Try another puzzle ?"
  830PRINT'"3  Do you think you can d
o better ?"
  840REPEAT:VDU28,0,31,39,28:CLS:*FX1
5,1
  850INPUT"What is your choice (1 to
3) ? " Q%
  860UNTIL Q%>0 AND Q%<4
  870IF Q%=3 AND J% PROCnewlist
  880ON Q% GOTO 180,170,160
  890END
  900DEFPROCinitialise
  910FOR I%=1 TO 9:READ D$(I%)
  920NEXT
  930FOR I%=1 TO 5:READ list$(I%):REA
D S%(I%)
  940NEXT
  950FOR I%=0 TO 15:READ R:R%(I%)=R+7
  960NEXT
  970ENDPROC
  980DEFPROCintroduction
  990VDU26:CLS:VDU19,0,4;0;
 1000PRINT'''"Welcome to Pete and his
collection of"'''"puzzling posters. Tr
y and help him sort"'''"out the letter
s into the correct order"'''"and earn
yourself a place on the list of"
 1010PRINT'TAB(14)"WIZZ KIDS"'''"Only
 puzzles 1 to 3 are shown sorted"'''"o
ut before being randomly jumbled just
"'''"like the other six."
 1020name$=""
 1030REPEAT:VDU28,0,31,39,28:CLS:*FX1
5,1
 1040INPUT"Enter your Name ? " name$
 1050IF LEN(name$)>8 name$=LEFT$(name
$,8)
 1060UNTIL name$<>""
 1070min=9999
 1080ENDPROC
 1090DEFPROCchoose
 1100REPEAT:VDU28,0,31,39,28:CLS:*FX1
5,1
 1110INPUT"Choose your puzzle (Enter
1 to 9) ? " P%
 1120UNTIL P%>0 AND P%<10
 1130ENDPROC
 1140DEFPROCstory
 1150PRINTTAB(14,2)"POOR"TAB(13,4)"PE
TE'S"TAB(12,6)"PUZZLING"TAB(13,8)"POS
TER"TAB(14,10)"No.";P%
 1160PROCwait(10):VDU19,1,1;0;19,2,4;
0;:PROCpieces
```

→

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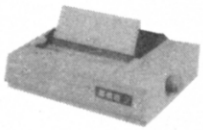

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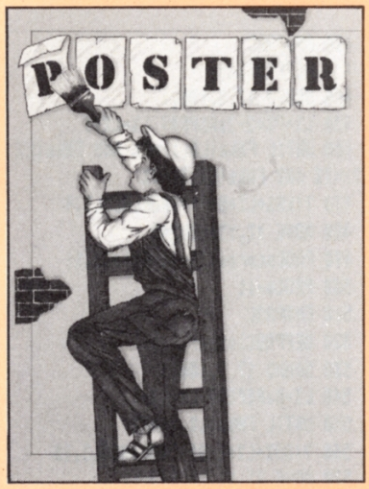
From Page 137

```
 1170COLOUR1:PRINTTAB(0,22)"THIS  IS
 WHAT  IT"'"SHOULD  LOOK  LIKE"'"HOWE
VER SOME NAUGHTYBOYS  HAVE  JUMBLED"'
"ALL   THE   LETTERS"
 1180COLOUR2:PRINT"CAN YOU TRY AND SO
RTIT OUT FOR POOR PETE":COLOUR3
 1190PROCwait(30)
 1200PRINT"Press the SPACE bar"
 1210REPEAT:UNTIL INKEY(-99)
 1220ENDPROC
 1230DEFPROCinstruct
 1240COLOUR2:PRINT"Use"'"to move the
 ";:COLOUR3:PRINT;"+";:COLOUR2:PRINT;
" symbolonto the  piece  youwish  to
 move  and sort out the Poster with
all  the  ";:COLOUR1:PRINT"red";:COLO
UR2:PRINT" squares at the  top":COLOU
R3
 1250PRINTTAB(4,0)"Up= *,  Down= ?
Left= Z, Right= X"
 1260ENDPROC
 1270DEFPROCnewlist
 1280IF J%=5 GOTO 1320
 1290FOR I%=4 TO J% STEP-1
 1300S%(I%+1)=S%(I%):list$(I%+1)=list
$(I%)
 1310NEXT
 1320S%(J%)=min:list$(J%)=name$
 1330ENDPROC
 1340DEFPROCboard(R%):T%=0
 1350FOR Y%=840 TO 360 STEP -160
 1360FOR X%=40 TO 520 STEP 160
 1370MOVE X%,Y%
 1380IF R%=1 C%=1+(T% DIV 8)-2*(T%=15

 1390IF R%=2 C%=1+((T%+T% DIV 4 MOD 2
)MOD 2)-2*(T%=12)
 1400PROCbox(C%,150)
 1410T%=T%+1
 1420NEXT
 1430NEXT
 1440ENDPROC
 1450DEFPROCpieces
 1460VDU5
 1470FOR I%=0 TO 15
 1480MOVE (I% MOD 4)*160+80,928-(I% D
IV 4)*160:PRINT A$(I%)
 1490NEXT
 1500VDU4:PROCwait(20)
 1510ENDPROC
 1520DEFPROCbox(C%,S%)
 1530GCOL 0,C%:PLOT 1,S%,0:PLOT 81,0,
S%:PLOT 1,-S%,0:PLOT 81,0,-S%:GCOL 0,
3
 1540ENDPROC
```




```
 1550DEFPROCfillposter
 1560K%=VAL(RIGHT$(D$(P%),1))
 1570FOR I%=0 TO 14:R%=I%+1
 1580PROCconvert
 1590NEXT
 1600A$(15)=" "
 1610ENDPROC
 1620DEFPROCjumble
 1630FOR I%=0 TO 16:C%(I%)=0:NEXT
 1640K%=VAL(RIGHT$(D$(P%),1))
 1650FOR L%=0 TO 14:I%=L%-(L%>11)
 1660R%=RND(8)+8*(I% DIV 4 MOD 2 EOR
I% MOD 2)
 1670IF R%=16 OR C%(R%) GOTO 1660
 1680PROCconvert:C%(R%)=-1
 1690NEXT
 1700A$(12)=" ":N%(12)=R%(15)
 1710ENDPROC
 1720DEFPROCconvert
 1730B%=VAL(MID$(D$(P%),R%*2,1)):A$(I
%)=CHR$(55+VAL(MID$(D$(P%),R%*2-1,1))
*K%+B%*((B%<7)-(B%>7)))
 1740N%(I%)=R%(R%-1)
 1750ENDPROC
 1760DEFPROCtest
 1770failed=FALSE:F%=0:T$=""
 1780FOR I%=0 TO 15
 1790IF N%(I%)=R%(I%) THEN F%=F%+1 EL
SE T$=T$+A$(I%)
 1800NEXT
 1810IF F%<16 failed=TRUE
 1820IF F%=14 AND LEFT$(T$,1)=RIGHT$(
T$,1) failed=FALSE
 1830IF N%(15)<>25 failed=TRUE
 1840IF NOT failed THEN solved=TRUE
 1850ENDPROC
 1860DEFPROCwait(W%)
 1870time=TIME
 1880REPEAT:UNTIL TIME>time+W%
 1890ENDPROC
 1900REM puzzle data
 1910DATA 22443721232727472224455636
37517
 1920DATA 94526343437454846374814241
82614
 1930DATA 32515261633135326143426271
51755
 1940DATA 47364422253756442337314324
45568
 1950DATA 53224641422244343246534364
34516
 1960DATA 43315465733562436143426233
35635
 1970DATA 24373323444231442733374745
22238
 1980DATA 42814261447494845332814241
82614
 1990DATA 53342243424636343122653433
66536
 2000DATA WIZARD,100,BRAINS,150,SMART
Y,200,PETE,250,GRANDPA,300
 2010DATA 1,3,5,7,8,6,4,2,9,11,13,15,
16,14,12,18
 4000 REM Wordcoder
 4010 REM Assemble the codes for all
the alphabet
 4020 MODE6
 4030 DIM A%(26,5),B%(26,5),K%(26,5)
 4035 PRINT TAB(15)"WORD CODER"'"Ent
er your 15 letters"'
 4040 D$="
     ":D$=""
 4050 FOR L%=1 TO 4
 4060 FOR S%=10 TO 35:Z$=CHR$(S%+55):
K%=L%+3
 4070 A%=INT(S%/K%):B%=S%-A%*K%
 4080 IF B%<8 A%=A%+1:B%=B%-K%
 4090 IF B%<-6 A%=A%-1:B%=B%+K%
 4100 IF A%>9 K%=K%+1:GOTO 4070
 4110 IF A%<0 K%=K%-1:GOTO 4070
 4120 A%(S%-9,L%)=A%:B%(S%-9,L%)=B%:K
%(S%-9,L%)=K%
 4130 NEXT
 4140 NEXT
 4150 REM Assemble code for the words
 4160 X%=RND(4)
 4170 FOR S%=1 TO 15
 4180 PRINT"Letter ";S%;" ?";:INPUT "
"A$:I%=ASC(A$)-64+32*(A$>="a")
 4190 D$=D$+STR$(A%(I%,X%))
 4200 IF B%(I%,X%)<0 D$=D$+STR$(-1*B%
(I%,X%)) ELSE D$=D$+"7"
 4210 NEXT
 4220 D$=D$+STR$(X%+3):PRINT 'D$'
```

This listing is included in this month's cassette tape offer. See order form on Page 175.

From Page 61

```
  10 REM MORRIS MINER
  20 REM By Jonathan Temple
  30 REM (c) The Micro User
  40 ON ERROR GOTO 3070
  50 MODE 2
  60 PROCinit
  70 PROCchars
  80 PROCenvs
  90 PROCstatus
 100 REPEAT
 110 REPEAT
 120 PROCsetvars
 130 PROCreset
 140 REPEAT
 150 PROCscreen
 160 REPEAT
 170 PROCman
 180 PROCdebris
 190 PROClift
 200 UNTIL E%
 210 IFE%=1 PROCkilled
 220 UNTIL Z%=0 OR E%
 230 IFZ%=0 E%=1
 240 PROCmessage
 250 UNTIL E%<>3
 260 PROCstatus
 270 UNTIL FALSE
 280 DEFPROCman
 290 A%=X%:B%=Y%:C%=V%:D%=W%
 300 IFPOINT(X%+8,Y%-68)<1 IFPOINT(X
%+48,Y%-68)<1 Y%=Y%-32:W%=W% EOR 1:F
%=F%+1:GOTO370
 310 IFF% SOUND 17,1,1,1:SOUND 18,0,
0,0:IFF%>9 E%=1 ELSE IFF% F%=FALSE
 320 IFINKEY-1 REPEAT UNTIL INKEY-2
 330 IFINKEY-103 IFPOINT(X%-8,Y%-32)
<>1 X%=X%-32:W%=W% EOR 1:SOUND 18,-10
,50,1:IFV%<>233 V%=233:W%=236
 340 IFINKEY-104 IFPOINT(X%+72,Y%-32
)<>1 X%=X%+32:W%=W% EOR 1:SOUND 18,-1
0,50,1:IFV%<>232 V%=232:W%=234
 350 IFINKEY-66 IFPOINT(X%+8,Y%+4)=6
 Y%=Y%+32:V%=V% EOR 1:W%=W% EOR 1:IFC
%<>238 V%=238:W%=240
 360 IFINKEY-98 IFPOINT(X%+8,Y%-68)=
6 Y%=Y%-32:V%=V% EOR 1:W%=W% EOR 1:IF
C%<>238 V%=238:W%=240
 370 IFD%<>W% GCOL3,14:MOVE A%,B%:VD
UC%,10,8,D%:MOVE X%,Y%:VDUV%,10,8,W%
 380 IFPOINT(X%,Y%-16)=9 IFX%MOD64=0
 PROCkey
 390 IFX%MOD64=0 N%=POINT(X%+48,Y%-2
8):IFN%=1 OR N%=15 PROCletter
 400 IFX%>1216 OR X%<0 OR Y%>860 OR
Y%<64 PROCnew
 410 T=T-.8:IF(T MOD32)=0 MOVE T,956
:GCOL0,0:VDU248:IFT<=0 E%=2
 420 ENDPROC
 430 DEFPROCkey
 440 SOUND 17,4,100,1
 450 L%=P%*2-2:REPEAT L%=L%+1
 460 UNTIL FNks(L%,1)=P% AND FNks(L%
,2)=X% AND FNks(L%,3)=Y%
 470 ?(KS%+L%*8-8)=TRUE:GCOL3,9
 480 MOVE X%,Y%:VDU242
 490 PROCscores(75+(6-G%)*25,1)
 500 PROCexit
 510 ENDPROC
 520 DEFPROCletter
 530 SOUND 17,2,100,1
 540 L%=0:REPEAT L%=L%+1
 550 UNTIL FNbs(L%,1)=P%
 560 ?(BS%+L%*8-8)=TRUE:GCOL3,15
 570 MOVE X%,Y%:VDU242+L%
 580 B$=LEFT$(B$,L%-1)+CHR$(242+L%)+
MID$(B$,L%+1)
 590 PROCscores(40+(6-G%)*10,0)
 600 IFINSTR(B$,"*")=0 PROCscores(40
0+(6-G%)*100,0)
 610 PROCbonus
 620 ENDPROC
 630 DEFPROCnew
 640 J%=-(X%>1216)-(X%<0)*2-(Y%>860)
*3-(Y%<64)*4
 650 P%=FNscr(P%,J%)
 660 IFJ%=1 X%=0 ELSE IFJ%=2 X%=1216
 670 IFJ%=3 Y%=156 ELSE IFJ%=4 Y%=86
0
 680 IFP%<8 U%=0:PROCscreen ELSE E%=
3
 690 ENDPROC
 700 DEFPROCdebris
 710 IFU%<=0 GOTO780
 720 IFABS(U%-Y%)<33 IFABS(T%-X%)<33
 E%=1
 730 GCOL3,13:MOVE T%,U%:VDU228
 740 U%=U%-32:IFU%=60 U%=0
 750 MOVE T%,U%:VDU228
 760 IFABS(U%-Y%)<33 IFABS(T%-X%)<33
 E%=1
 770 ENDPROC
 780 IFY%<750 IFRND(8%*5)=1 T%=X%+RN
D(2)*64-RND(2)*64:U%=892:SOUND 17,3,1
00,55:GCOL3,13:MOVE T%,U%:VDU228
 790 ENDPROC
 800 DEFPROClift
 810 M%=FALSE:IFPOINT(X%+8,Y%-68)=5
IFPOINT(X%+48,Y%-68)=5 M%=TRUE
 820 GCOL3,5:MOVE Q%,R%:VDU226,227
 830 Q%=Q%+IX%:R%=R%+IY%
 840 MOVE Q%,R%:VDU226,227
 850 IFM% GCOL3,14:MOVE X%,Y%:VDUV%,
10,8,W%:X%=X%+IX%:Y%=Y%+IY%:MOVE X%,Y
%:VDUV%,10,8,W%
 860 IFIX% IFQ%=L1% OR Q%=L2% IX%=-I
X%
 870 IFIY% IFR%=L3% OR R%=L4% IY%=-I
Y%
 880 ENDPROC
 890 DEFPROCscores(IS%,IK%)
 900 S%=S%+IS%:VDU4,17,14,31,0,3
 910 PRINT LEFT$("000000",6-LEN(STR$
(S%)))+STR$(S%)
 920 K%=K%+IK%:VDU17,14,31,14,3
 930 PRINT ;K%;:VDU17,9,242,5
 940 ENDPROC
 950 DEFPROCbonus
 960 VDU24,448;968;872;1012;18,0,132
,16,24,448;976;880;1020;18,0,134,16,1
8,0,4,25,4,512;1008;
 970 PRINT B$:VDU26
 980 ENDPROC
 990 DEFPROCexit
1000 IFK%=14 IFP%=1 VDU4,17,6,17,128
,31,11,4,225,18,8,225,18,8,225,31,12,
5,231,229,230,5
1010 ENDPROC
1020 DEFPROCkilled
1030 Z%=Z%-1:SOUND 0,1,100,2
1040 PROCreset:TIME=0
1050 REPEATUNTILTIME>100
1060 ENDPROC
1070 DEFPROCmessage
1080 N%=((T DIV16)*25+Z%*250)*(6-G%)
1090 IFE%=3 PROCscores(N%,0)
1100 VDU4,28,1,20+(E%<3)*5,18,10,12,
17,1,31,4,1
1110 IFE%<3 PRINT"GAME OVER" ELSE PR
INT"WELL DONE"
1120 COLOUR6:IFE%=3 PROCcongrats
1130 COLOUR3:PRINT''TAB(5)"(SPACE)"
1140 VDU5:REPEAT UNTIL GET=32
1150 VDU4,26,12,5
1160 ENDPROC
1170 DEFPROCcongrats
1180 PRINT'" BONUS: ";N%'"" Now try
again !"
1190 G%=G%-1:IFG%=0 G%=1
1200 RESTORE 1250:N%=81:*FX 15,0
1210 FOR L%=1 TO 10:READ A%,D%:N%=N%
+A%
1220 SOUND 1,-15,N%,D%
1230 SOUND 2,-10,N%+48,D%:NEXT
1240 ENDPROC
1250 DATA 0,4,8,4,8,4,4,4,8,8,-12,8
1260 DATA 4,8,-12,8,8,8,-16,8
1270 DEFPROCstatus
1280 LS%=S%:PROCreset
1290 PROCsetvars:PROCscreen
1300 VDU4,28,1,22,18,8,12,17,1
1310 PRINT''TAB(3)"MORRIS MINER"
1320 IFLS%>H% PROChigh:GOTO1300
1330 COLOUR6:PRINT'" HI SCORE: ";H%
;'"" BY: "H$'"" SKILL LEVEL: ";G%
1340 COLOUR3:PRINT''TAB(6)"(SPACE)"
```

```
1350 VDU5:REPEAT
1360 N%=(GET OR &10)-48
1370 IFN%)0 AND N%<6 VDU4,31,14,9,N%
+48,5:8%=N%
1380 UNTIL N%=0:VDU4,26,12,5
1390 ENDPROC
1400 DEFPROChigh
1410 CLS:PRINT''TAB(1);"CONGRATULATI
ONS !"
1420 COLOUR6:PRINT''" Please enter y
our name:-"'" ";
1430 !&900=&200C0985:?&904=&7F
1440 A%=0:X%=0:Y%=9:CALL &FFF1
1450 H$=$&985:H%=L8%
1460 ENDPROC
1470 DEFPROCreset
1480 P%=5:E%=FALSE:F%=FALSE
1490 T%=0:U%=0:X%=320:Y%=412
1500 V%=232:W%=234
1510 ENDPROC
1520 DEFPROCsetvars
1530 IFE%<>3 Z%=3:S%=0
1540 K%=0:T=1280-(5-8%)*64
1550 B$="*****":RESTORE 1650
1560 FOR L%=0 TO 19:READ N%
1570 ?(BS%+L%*2)=N%
1580 ?(BS%+L%*2+1)=N% DIV256:NEXT
1590 FOR L%=0 TO 13:M%=KS%+L%*8
1600 !M%=0:M%?2=(L%+2)DIV 2
1610 READ N%:M%?4=N%:M%?5=N% DIV256
1620 READ N%:M%?6=N%:M%?7=N% DIV256
1630 NEXT
1640 ENDPROC
1650 DATA 0,2,64,476,0,3,832,156
1660 DATA 0,4,1152,380,0,6,896,796
1670 DATA 0,7,704,444
1680 DATA 1152,796,128,316,1216,444
1690 DATA 640,156,192,828,1152,444
1700 DATA 448,444,1152,252,64,700
1710 DATA 64,540,448,604,896,604
1720 DATA 320,860,128,476
1730 DEFPROCinit
1740 SCR%=&A00:BS%=SCR%+28:KS%=BS%+4
0
1750 RESTORE 1810
1760 FOR L%=0 TO 27:READ SCR%?L%:NEX
T
1770 VDU19,7,3;0;19,8,7;0;19,9,3;0;1
9,12,2;0;19,14,7;0;
1780 H%=1000:H$="J. Temple"
1790 8%=5:S%=0
1800 ENDPROC
1810 DATA 2,0,8,4,3,1,0,5,0,2,0,6
1820 DATA 5,0,1,0,6,4,2,7,0,5,3,0
1830 DATA 0,0,5,0
1840 DEFPROCscreen
1850 VDU4,12,5
1860 PROCbonus:PROCscores(0,0)
1870 VDU4,17,14,31,18,3
1880 PRINT STRING$(Z%-1,CHR$232)
1890 COLOUR1:PRINTTAB(0,2)STRING$(5,
CHR$(248))
1900 COLOUR3:PRINTTAB(5,2)STRING$(15
,CHR$(248))
1910 IFT<1279 VDU24,T;932;1279;960;1
8,0,128,16,26
1920 VDU28,0,31,19,4
1930 RESTORE 2330:IFP%>1 PROCread
1940 READ N1%,N2%,L1%,L3%,L2%,L4%,IX
%,IY%
1950 VDU17,1,17,131
1960 FOR L%=1 TO N1%:READ A$
1970 D$="":IFASC(MID$(A$,5,1))>55 D$
=CHR$(10)+CHR$(8)
1980 PRINTTAB(FNdec,FNdec) STRING$((
FNdec AND &7F)-1,CHR$(224)+D$)+CHR$(2
24)
1990 NEXT
2000 VDU17,6,17,128
2010 FOR L%=1 TO N2%:READ A$
2020 PRINTTAB(FNdec,FNdec) STRING$(F
Ndec,CHR$(225)+CHR$(10)+CHR$(8))
2030 NEXT
2040 Q%=L1%:R%=L3%:VDU26
2050 PROCexit:VDU5:GCOL3,14
2060 MOVE X%,Y%:VDUV%,10,8,W%
2070 GCOL3,5:MOVE Q%,R%:VDU226,227
2080 GCOL3,15:FOR L%=1 TO 5
2090 IFFNbs(L%,0)=0 IFFNbs(L%,1)=P%
MOVE FNbs(L%,2),FNbs(L%,3):VDU242+L%
2100 NEXT
2110 GCOL3,9:FOR L%=P%*2-1 TO P%*2
2120 IFFNks(L%,0)=0 MOVE FNks(L%,2),
FNks(L%,3):VDU242
2130 NEXT
2140 ENDPROC
2150 DEFPROCread
2160 FOR L%=1 TO P%-1
2170 READ N1%,N2%
2180 FOR N%=1 TO 6:READ A%:NEXT
2190 FOR N%=1 TO N1%:READ A$:NEXT
2200 FOR N%=1 TO N2%:READ A$:NEXT:NE
XT
2210 ENDPROC
2220 DEFFNscr(N%,J%)
2230 =?(SCR%+N%*4+J%-5)
2240 DEFFNbs(N%,B%)
2250 M%=BS%+N%*8+B%*2-8
2260 =?M%+M%?1*256
2270 DEFFNks(N%,B%)
2280 M%=KS%+N%*8+B%*2-8
2290 =?M%+M%?1*256
2300 DEFFNdec
2310 C$=LEFT$(A$,2):A$=MID$(A$,3)
2320 =EVAL("&"+C$)
2330 DATA 13,3,576,412,832,412,32,8
2340 DATA 00009A,100086,04030C,04048
2
2350 DATA 110503,00080C,04090C,050F0
4
2360 DATA 0F0F05,001405,0B1809,0B190
1
2370 DATA 131901,070119,031208,0D160
4
2380 DATA 15,4,960,636,960,156,0,-32
2390 DATA 000507,0F0504,02060A,000A0
7
```

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```
 2400 DATA 000F03,041088,051003,0C100
3
 2410 DATA 111003,071405,0C1403,0C170
3
 2420 DATA 00180A,001901,000014,07030
D
 2430 DATA 0E0307,0C0008,0D1505
 2440 DATA 15,3,64,252,640,252,32,0
 2450 DATA 000014,000184,050190,13019
9
 2460 DATA 020402,060506,0C0505,0C090
6
 2470 DATA 001003,061009,121002,00118
9
 2480 DATA 0C1404,011904,07190D,01021
8
 2490 DATA 08030D,0F0E06
 2500 DATA 17,5,960,668,960,156,0,-32
 2510 DATA 00009A,000314,130003,0B000
8
 2520 DATA 110305,0E0907,03008C,11000
3
 2530 DATA 010C0B,110D03,130E04,03100
C
 2540 DATA 111203,01140B,011911,11168
3
 2550 DATA 121602,030003,070008,0D000
8
 2560 DATA 120107,0E1405
 2570 DATA 16,4,640,300,896,300,32,0
 2580 DATA 000004,010310,030006,00000
3
 2590 DATA 000D03,0A0705,110308,11000
3
 2600 DATA 031107,031208,001603,06160
A
 2610 DATA 091703,101004,131109,00190
1
 2620 DATA 070F0B,0E1406,0D0007,09050
C
 2630 DATA 14,2,640,764,640,284,0,-32
 2640 DATA 03000B,13009A,040506,0C050
7
 2650 DATA 000B04,050B05,0C0B05,070C0
9
 2660 DATA 0E0C09,001005,00100A,04140
3
 2670 DATA 0A1402,011912,01000B,12031
6
 2680 DATA 14,5,512,668,512,156,0,-32
 2690 DATA 00009A,030003,090003,13009
A
 2700 DATA 010312,010007,0A0B06,0F0C0
9
 2710 DATA 030E05,0A1009,011203,03138
2
 2720 DATA 041404,011912,070003,0E000
3
 2730 DATA 0B010A,110110,050600
 2740 DEFPROCchars
 2750 VDU23,224,223,223,223,0,-5,-5,-
5,0
 2760 VDU23,225,66,66,66,66,126,66,66
,66
 2770 VDU23,226,127,127,127,127,120,1
12,96,0
 2780 VDU23,227,-2,-2,-2,-2,30,14,6,0
 2790 VDU23,228,0,44,50,110,36,90,52,
0
 2800 VDU23,229,0,58,34,49,34,58,0,12
7
 2810 VDU23,230,0,174,164,36,164,164,
0,-1
 2820 VDU23,231,4,14,31,14,14,14,14,1
4
 2830 VDU23,232,48,56,48,48,32,48,48,
48
 2840 VDU23,233,12,28,12,12,4,12,20,2
0
 2850 VDU23,234,48,56,48,48,32,32,32,
48
 2860 VDU23,235,48,56,48,48,48,168,20
0,12
 2870 VDU23,236,20,28,20,12,4,4,4,12
 2880 VDU23,237,20,28,20,12,20,21,19,
48
 2890 VDU23,238,24,26,26,126,88,88,24
,30
 2900 VDU23,239,24,88,88,126,26,26,24
,120
 2910 VDU23,240,20,20,20,22,16,16,16,
48
 2920 VDU23,241,48,48,48,184,8,8,8,12
 2930 VDU23,242,0,0,96,159,149,149,96
,0
 2940 VDU23,243,-4,66,66,124,66,66,66
,-4
 2950 VDU23,244,124,130,130,130,130,1
30,130,124
 2960 VDU23,245,194,194,162,146,146,1
38,134,134
 2970 VDU23,246,130,130,130,130,130,1
30,130,124
 2980 VDU23,247,124,130,120,124,2,2,1
30,124
 2990 VDU23,248,0,0,0,-1,-1,-1,0,0
 3000 ENDPROC
 3010 DEFPROCenvs
 3020 ENVELOPE 1,1,0,0,0,0,0,0,90,-1,
-2,-3,97,97
 3030 ENVELOPE 2,130,1,0,2,5,2,6,126,
-3,-1,-3,120,80
 3040 ENVELOPE 3,3,-1,-1,-1,70,50,1,1
00,-1,-1,-10,101,5
 3050 ENVELOPE 4,133,8,4,8,3,1,1,126,
0,0,-10,126,0
 3060 ENDPROC
 3070 IFERR=17 THEN RUN
 3080 MODE7:REPORT:PRINT" at line ";E
RL
 3090 END
```

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MU3

From Page 111

Program I

```
  100 REM ***********************
  110 REM *                     *
  120 REM * Character  Definer *
  130 REM *                     *
  140 REM *   By Robin Nixon    *
  150 REM * (c) The Micro User *
  160 REM *                     *
  170 REM ***********************
  180 REM
  190 DIM CH% 8,A%(8,8),OS% 100:CC$="
"
  200 MODE2:VDU23;8202;0;0;0;:RR%=12:
SS%=5
  210 ON ERROR GOTO680
  220 *FX4,1
  230 *FX11,15
  240 *FX12,15
  250 *FX20
  260 PROCgrid
  270 *FX20
  280 PROCshowall
  290 VDU31,0,18:COLOUR3:PRINT"To sav
e or load a"'"file, press ESCAPE.
      "':COLOUR7:PRINT"To edit a chara
cter"'"Select it using the"'"cursor k
eys."'"Then press RETURN.";STRING$(80
," "):COLOUR5
  300 PRINT"Which character?";:*FX15
  310 PROCselect
  320 PC%=RR%-12+((SS%-5)/2)*8+224
  330 PROCgetinfo(PC%)
  340 CLS:PROCgrid:PROCshowall:PROCsh
owcharacter
  350 X%=1:Y%=1:VDU31,3,16:PRINT;PC%;
  360 VDU31,0,19:COLOUR2:PRINT"Use th
e cursor keys"'"to move.":COLOUR1:PR
INT"The space bar sets"'"and resets a
 point.":COLOUR4:PRINT"C clears the
grid."''
  370 COLOUR7:PRINT"Press RETURN when
"'"you have finished."
  380 REPEATPROCcursor:*FX15
  390 REPEATG%=GET:UNTILG%=13 OR G%=3
2 OR G%>135 AND G%<140 OR G%=67:PROCc
ursor
  400 IFG%=136 X%=X%-1:IFX%=0 X%=8
  410 IFG%=137 X%=X%+1:IFX%=9 X%=1
  420 IFG%=138 Y%=Y%+1:IFY%=9 Y%=1
  430 IFG%=139 Y%=Y%-1:IFY%=0 Y%=8
  440 IFG%=32:A%(Y%,X%)=A%(Y%,X%)EOR1
:PROCset(Y%,X%)
  450 IFG%=67:VDU23,PC%,0,0,0,0,0,0,0
,0::X1%=X%:Y1%=Y%:PROCgetinfo(PC%):X%
=X1%:Y%=Y1%:PROCshowcharacter:PROCsho
wall
  460 UNTILG%=13
  470 VDU23,PC%;FORP%=1TO8:QQ%=0:FORQ
%=1TO8:QQ%=QQ%+A%(P%,Q%)*2^(8-Q%):NEX
T:VDUQQ%:NEXT
  480 GOTO260
  490 DEFPROCgetinfo(PC%):X%=CH% MOD
&100:Y%=CH% DIV &100:A%=10:?CH%=PC%:C
ALL&FFF1:ENDPROC
  500 DEFPROCgrid:VDU31,2,0:COLOUR2:P
RINT"Character Definer":COLOUR4:VDU31
,4,1:PRINT"R.Nixon  1985":GCOL0,7
  510 FOR J%=1 TO 9
  520 MOVEJ%*72,896:DRAWJ%*72,608
  530 MOVE72,(J%+16)*36-4:DRAW648,(J%
+16)*36-4
  540 NEXT
  550 ENDPROC
  560 DEFPROCcursor:GCOL3,6:MOVEX%*72
,(10-Y%+16)*36-4:DRAW(X%+1)*72,(10-Y%
+16)*36-4:DRAW(X%+1)*72,(9-Y%+16)*36-
4:DRAWX%*72,(9-Y%+16)*36-4:DRAWX%*72,
(10-Y%+16)*36-4:ENDPROC
  570 DEFPROCshowcharacter
  580 FORJ%=1 TO 8
  590 FORK%=1 TO 8
  600 IF(CH%?J%) AND (2^(8-K%)) A%(J%
,K%)=1 ELSE A%(J%,K%)=0
  610 PROCset(J%,K%)
  620 NEXT
  630 NEXT
  640 ENDPROC
  650 DEFPROCshowall:VDU28,12,13,19,5
:CLS:COLOUR6:FORJ%=224 TO 255:VDUJ%:I
FJ%MOD8=7 PRINT
  660 NEXT:VDU26,31,12,14:COLOUR7:COL
OUR129:PRINTCC$:COLOUR128:ENDPROC
  670 DEFPROCset(P%,Q%):GCOL0,A%(P%,Q
%)*4:PLOT4,Q%*72+8,(10-P%+16)*36-8:PL
OT4,(Q%+1)*72-8,(10-P%+16)*36-8:PLOT8
5,Q%*72+8,(10-(P%+1)+16)*36:PLOT85,(Q
%+1)*72-8,(10-(P%+1)+16)*36:PLOT69,46
0+Q%*8,476+(9-P%)*4:ENDPROC
  680 *FX4
  690 *FX11,20
  700 *FX12,2
  710 ONERROR CLS:REPORT:PRINT" at li
ne ";ERL:END
  720 MODE6:VDU31,0,10:PRINT"Do you w
ant to save this character set";:PROC
yn:IF G$="N" OR G$="n" GOTO750
  730 PRINT'':*.
  740 INPUT''"Enter file name ? C."$O
S%:CC$=$OS%:$OS%="*SAVE C."+$OS%+" C8
0 D80":X%=OS% MOD &100:Y%=OS% DIV &10
0:CALL&FFF7:GOTO200
  750 PRINT''"Do you want to load a c
haracter set";:PROCyn:IF G$="N" OR G$
="n" PRINT''"BYE":END
  760 PRINT'':*.
  770 INPUT''"Enter file name ? C."$O
S%:CC$=$OS%:$OS%="*LOAD C."+$OS%:X%=O
S% MOD &100:Y%=OS% DIV &100:CALL&FFF7
:GOTO200
  780 DEFPROCyn:REPEATG$=GET$:UNTILG$
="Y" OR G$="y" OR G$="N" OR G$="n":EN
DPROC
  790 DEFPROCselect
  800 COLOUR4:COLOUR129:VDU31,RR%,SS%
,RR%-12+((SS%-5)/2)*8+224
  810 REPEAT:GG%=GET:COLOUR6:COLOUR12
8:VDU31,RR%,SS%,RR%-12+((SS%-5)/2)*8+
224
  820 IFGG%=136 RR%=RR%-1:IFRR%=11 RR
%=19:SS%=SS%-2:IFSS%=3 SS%=11
  830 IFGG%=137 RR%=RR%+1:IFRR%=20 RR
%=12:SS%=SS%+2:IFSS%=13 SS%=5
  840 IFGG%=138 SS%=SS%+2:IFSS%=13 SS
%=5
  850 IFGG%=139 SS%=SS%-2:IFSS%=3 SS%
=11
  860 COLOUR4:COLOUR129:VDU31,RR%,SS%
,RR%-12+((SS%-5)/2)*8+224
  870 UNTILGG%=13:COLOUR128:ENDPROC
```

Program II

```
  100 REM ***********************
  110 REM *                     *
  120 REM * Custom  Characters *
  130 REM *   By Robin Nixon    *
  140 REM *                     *
  150 REM * (c) The Micro User *
  160 REM *                     *
  170 REM ***********************
  180
  190 MODE4
  200
  210 *LOAD C.FONT-N 900
  220 *LOAD C.FONT-U A00
  230 *LOAD C.FONT-L C00
  240
  250 ?&367=&70
  260 ?&368=&9
  270 ?&369=&A
  280 ?&36A=&C
  290
  300 END
```

This listing is included in this month's cassette tape offer. See order form on Page 175.

Vine Micros

What is ADDCOMM?

DEFINITION: ADD – Join, as increase or supplement. COMM (Abrev. for command) – Have at disposal, or within reach.

DESCRIPTION: 8K sideways ROM holding machine code program.

CONTENTS: Useful mixture of 40 extra BASIC statements.

ORIGINAL: Very! First, and only utility to offer TOOLKIT and GRAPHIC commands.

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Whichever way you look at it, and whether you use the BBC 'B', BBC 'B+' computers, or the Electron with add-on ROM facility, **ADDCOMM** offers the very best value for money.

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Rewritten for disc with many NEW features!

Practice your bidding: Perfect your card-play: Create your own archive of interesting hands

With high resolution colour graphics and sound, BRIDGE-MENTOR II guides you, step-by-step, through expertly analysed hands. A host of features including the spectacular "AUTOPLAY" option. The package now includes the famous "Challenge" hands archive . . . in total-over 60 testing hands to improve your game . . . with unlimited scope for more !!!

For Individual Practice, Analysis and Archiving

£17.50 (includes "The Challenge" archive)
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THE ULTIMATE IN GRAPHIC INPUT DEVICES FOR THE BBC MICRO.

GRAFPAD II: ● A brilliant British invention manufactured in Gt. Britain, unequalled in the world of graphics input.

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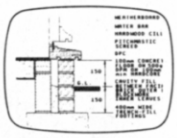

Architectural design with DDX Software

Free-hand drawing Icon Software

SPECIFICATION
Resolution:
1280 x 1024 pixels
Repeatability:
1 pixel
Output rate:
2000 co-ordinate pairs per sec.
Interface:
parallel
Origin:
LH corner or selectable
Dimensions:
350 x 260 x 12 mms.

IT COMBINES IN ONE DEVICE ALL THE FACILITIES OF PREVIOUS ATTEMPTS AT INPUT DEVICES. THE APPLICATIONS ARE AS NUMEROUS AS THAT OTHER COMMONLY HELD DEVICE – A PEN! – AND INCLUDE: ● Option Selection ● Form Input ● Data Collection ● Logic Design ● Circuit Design ● Picture creation ● Picture storage ● Picture retrieval ● Construction design ● C.A.D. ● Text Illustration ● Games ● Pattern Design ● Education ● PCB Design

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TYPE-BBC

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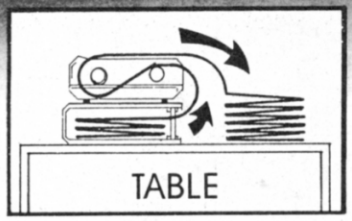

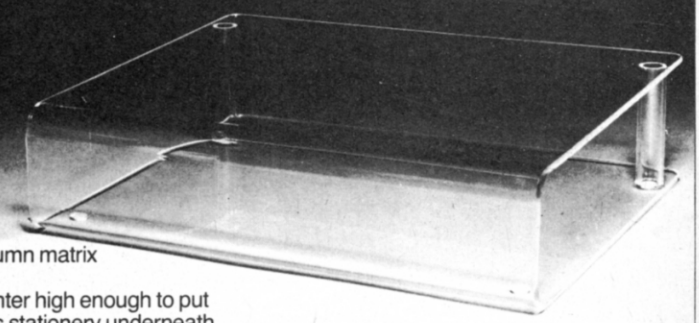

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- *No soldering*
- *Simply plug in for instant dualling*
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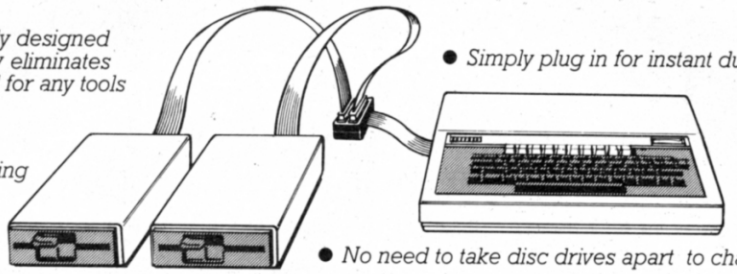

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- Postage and packing **£2.50** inc. VAT.
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The safest way to look after your growing collection of ROMs is to store them in Viglen's specially designed cartridge systems, this not only keeps them happy, but also removes the risk of damage to your BBC micro.

There are two systems – the 'Standard' and the 'Low Profile'. Viglen is the leading producer of both.

ADVANTAGES OF VIGLEN ROM CARTRIDGE SYSTEM

● All cartridges are gold-plated for durability and reliability, unlike others which are only silver plated. ● No need to switch machine off between cartridge changes. ● Insert and remove 'Wordwise' 'View' 'Disc Doctor', etc., at will, from your micro in absolute safety. ● Low, low power consumption unlike other systems. ● Save on memory.

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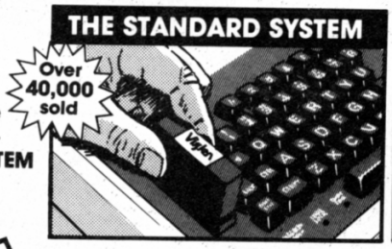
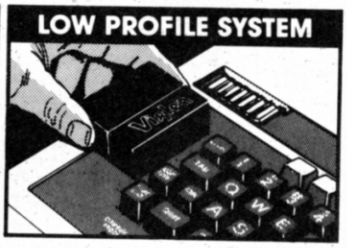


The Standard System used extensively in education is preferred, due to its robust construction and ease of use.

LOW PROFILE SYSTEM



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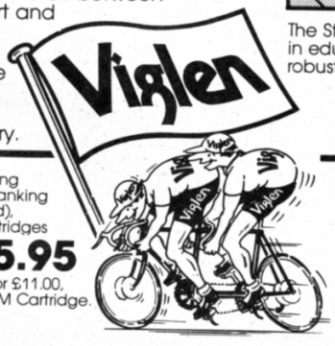

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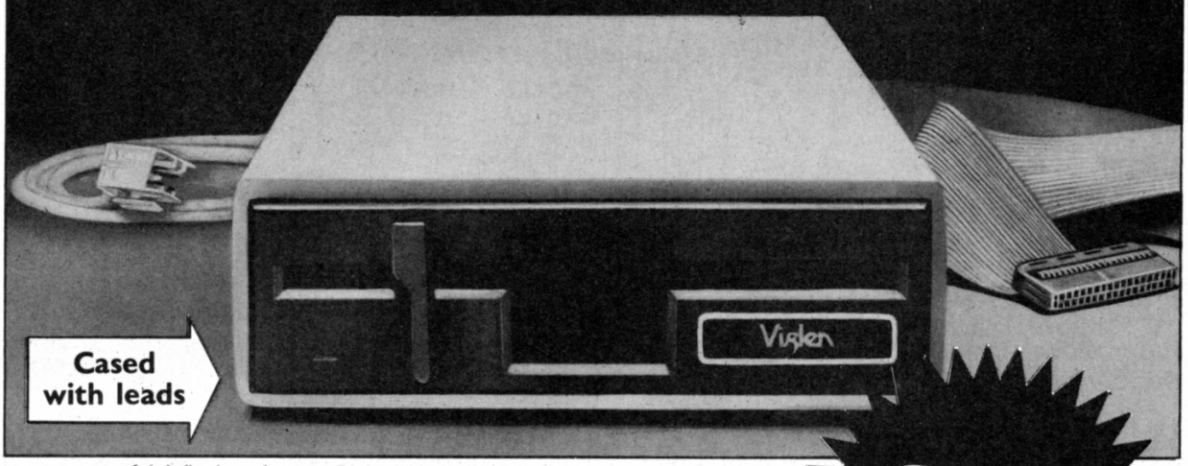

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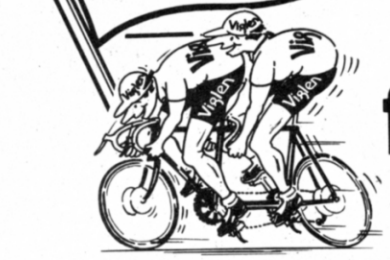

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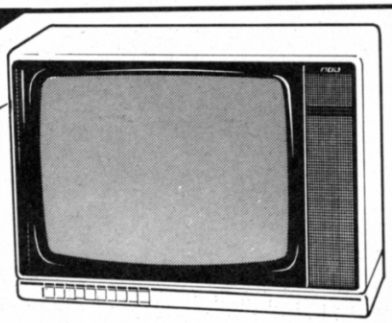

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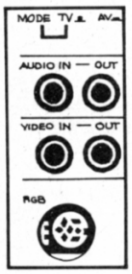

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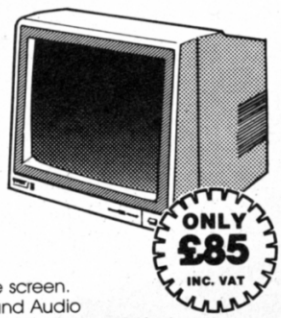

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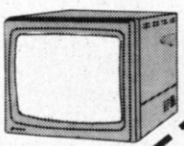

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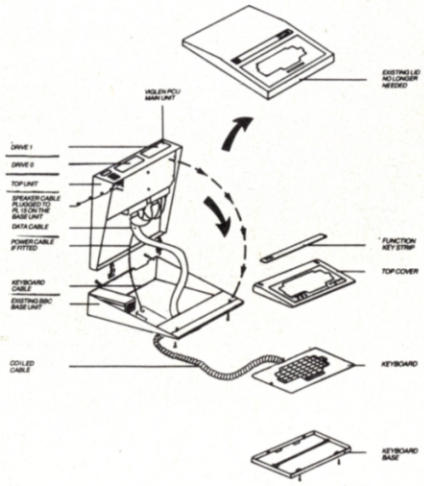

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Viewstore's quite at home with the B+

IN the November issue of The Micro User *Jim Notman reviewed the Acorn ADFS and I wonder if his experience in doing so will help me.*

I want to change to the B+ 128k with ADFS keeping my Viewstore and View 2.1 ROMs, but am assured by the dealer that neither will work with the B+.

Viewstore accesses the DFS directly and is incompatible. The 1770 does not emulate the 8271 as it should.

I find this hard to believe, but cannot resolve the uncertainty on my own. Could it be that Mr Notman had the B+ in use with Viewstore and could help? I would very much appreciate his comments.

I am aware that only 25k could be used by these ROMs and have no protected discs to worry about. – **Peter Hammett, Blackheath**

● I cannot understand why your dealer should have given you such a story. Possibly he was confusing it with another piece of software.

Viewstore was written for the standard Acorn DFS (both 8271 and 1770 controllers) as well as Acorn's Advanced Disc Filing system which needs a 1770 controller.

Although I haven't yet had the opportunity to try it out on a 128k B+, it will work perfectly happily with the 64k B+.

At the moment I'm using Viewstore on a non-Acorn Winchester hard disc, with a dramatic improvement in speed.

Jim Notman

80 column text display

CONGRATULATIONS on your Mini Office software, it's excellent value for money. I use it on a BBC Micro, and I've been sufficiently impressed to buy another version for my son's Spectrum.

I use a monitor with the BBC machine however, and it would be useful with the word processor if I could display text in 80 rather than 40 columns on screen – and better still if I could specify the number of columns to be displayed on each line of the screen.

That way the document would look the same on the screen as it will on the paper when I print it.

Can you advise on a way to modify the program? Please understand I want to use the program strictly for my own use only.

As my printer is not an Epson it would also be helpful if I could change some of the output codes for double height characters, page feeds and so on. – **John Reynolds, Colchester.**

● There is no way you can modify the program but you'll find that Mini Office II will solve all your problems. This new version has facilities that were missing in the original program.

Error in the squash

I HAVE finally got round to typing in the program Astromines from the March 1985 issue of The Micro User.

On trying to run the program all I get is Syntax error at line 50.

The book says that line 50 is either:

```
50 VDU23;8202;0;0;0;
```

or:

```
50 VDU23;B202;0;0;0;
```

I can't really make out which, but in any case I get the same result. As you will tell from my query I am a rank novice, but I have spent a lot of time typing in the program and I would be very grateful if you would let me know what is wrong. – **H. Hanksworth, Sudbury.**

● The line you're referring to is responsible for turning off the cursor. The character which is causing the problem is the number 8 in 8202.

The listings we produce are done on the Epson FX80 in condensed print. Unfortunately this squashes characters up and could make it difficult to distinguish between certain ones.

In the example you can see the problem. The line with the B (the second one) is incorrect and will cause an error. However, the top one shouldn't have given an error, as this is fine.

Setting the format

LAST year, at the age of 62, I decided to take a large leap into the modern era by purchasing the following computer equipment: BBC B with DFS and Wordwise, Midwich disc drive, Philips green screen monitor and Juki 6100 daisywheel printer.

I must say it has all been very satisfactory except in one way. One lad uses it for all his games, though he moans a bit because I haven't got a colour monitor.

I do all the estimates for another lad, and this seems to give him a lot of pecuniary pleasure.

We keep track of the housekeeping bills via Database Software's Mini Office disc.

My wife saves all the notes needed for her university course, which means that she can now read them.

I, on the other hand, still cannot achieve what I bought it for, which was to facilitate my hobby of playwriting.

I can get the following format:

RICHARD
Now is the winter of our discontent made summer and so on . . .

But I don't want that. What I want to do is to follow the normal format:

RICHARD: Now is the winter of our discontent made summer and so on . . .

allowing the text to be tabled beside the name in justified blocks.

It's all very irritating. Is it possible to achieve with the above equipment, please, or what else do I need? – **Peter R. Drake, Haywards Heath.**

● We have achieved the result you see here by entering the following embedded commands before the start of text

LL27 Sets line length.

IN6 Sets indent for main text.

Then for any line that you wish to start in the margin, the example here are the commands LL27, IN6 and TI0. You use the embedded command:

TI0 to cancel the indent on each individual line you require. Obviously you can set the line length to suit your own needs. Here we have set to a length compatible with the magazine page.

We would like to thank Paul Beverley of Norwich Computers for his help in this matter. His books The Wordwise Applications Guide and its follow up Using Wordwise Plus contain lots of useful hints and tips like this, although the one shown here does not appear in the first.

On ROMs and RAMs

IN the December issue of your magazine there is a letter from Roger King asking about using Watford Electronics' RAM and ROM boards alongside the Solidisk DDFS disc interface with version 2.0 ROM.

I have recently added both the 32k printer buffer/expansion board and the solderless sideways ROM socket board from

→

From Page 153

Watford Electronics, having had the Solidisk disc interface fitted for some time.

*This set-up seems to work perfectly, although, as you said in your reply to the letter, any program which directly accesses the screen memory will not work without first switching the RAM board off with the supplied *RAMOFF command – with one exception.*

*I added a pair of 6264 RAM chips to the ROM board (to act as sideways RAM) and can only write to this memory with the *RAMEDIT utility which is supplied on the RAM board's control ROM.*

I have written to Watford Electronics about this fault, and am waiting for their reply.

Please accept my apologies for this rather complex description – having a RAM board with a control ROM and a ROM board containing RAM is useful but confusing!

I hope that this letter may put Mr King's mind at rest concerning the advisability of purchasing the Watford Electronics RAM and ROM boards for his machine. – **C.S.R. Bailey, Birmingham.**

Othello and the Tube

I AM having problems with your Othello game from the June 1985 issue of The Micro User. *I have checked my listing again several times, but I am still unable to find my mistake, so I would like to ask your help.*

The problem is that the program does not display the playing board. The title and the two boxes in the upper part of the screen seem to appear OK, but there is nothing else. The sound effects are, as far as I can tell, normal.

My equipment is a BBC B with OS 1.20, DNFS 1.20, 6502 second processor and Hibasic. I also have Viewsheet ROM (1.0) and Beebugsoft's Spellcheck II ROM (v1.20) fitted.

I use twin Canon slim disc drives and a Yanjen Model GM-1211 high resolution green monitor.

My congratulations for an excellent magazine. – **John Stares, Den Haag, The Netherlands.**

● The problem is caused by the fact that Othello pokes the screen directly and this will not work across the Tube.

All lines that poked the screen can be replaced with VDU statements. If you replace the following lines in your listing, Othello should work fine on a standard BBC Micro with or without a second processor.

```
  680 DEF PROCboard:VDU31,1
3,0:PRINT;CHR$141CHR$129CHR
$157CHR$131"OTHELLO  "CHR$1
56'SPC13;CHR$141CHR$129CHR$
157CHR$131"OTHELLO  "CHR$15
6:FORJ%=1TO17:VDU 31,7,7+J%
,133,157,31,34,7+J%,156:NEX
T
  710FORJ%=1TO8:SOUND1,-15,
J%*20,1:FORK%=1TO8:XX%=7+J%
*3:YY%=7+K%*2:PCE%=A%(J%,K%
):IFPCE%=0 GRAPH%=130 ELSE
IFPCE%=-1 GRAPH%=145 ELSE I
FPCE%=1 GRAPH%=148
  720VDU31,XX%-1,YY%,GRAPH%
,255:NEXTK%,J%:ENDPROC
 1030DEF PROCon:VDU31,6+PM1
%(N%)*3,7+PM2%(N%)*2,CH%:EN
DPROC
 1040DEF PROCon:VDU31,6+PM1
%(N%)*3,7+PM2%(N%)*2,255:EN
DPROC
```

Speedy service

WHEN a fault developed in the disc drives I had bought from Akhter Computer Group it was with an element of trepidation that I returned them for repair under the two year guarantee.

Having heard and read so many horror stories regarding levels of after sales service in the industry and extended repair times, I couldn't believe Akhter would fulfil their promise to have my drives returned in a week.

They were handed in to Securicor in Aberdeen on Tuesday December 3 at 1030 hours and were delivered back to my office on Tuesday December 10 after a round trip of 1000 miles. How's that for service? Thank you Akhter! – **T.J.D. Erskine, Aberdeen.**

Big problem

WHY does Program I below produce:

THE MICRO USER

but Program II produces only:

MICRO

instead of:

THE MICRO USER

as I would expect, and how can the expected result be obtained?

– P. Sargent, Sheffield.

```
  10 MODE 7
  20 PRINT TAB(0,4)"THE"CH
R$141"MICRO"CHR$140"USER"
  30 PRINT TAB(3,5)CHR$141
"MICRO"
```

Program I:

```
  10 MODE 7
  20 PRINT TAB(3,4)CHR$141
"MICRO"
  30 PRINT TAB(0,5)"THE"CH
R$141"MICRO"CHR$140"USER"
```

Program II:

● The problem you are encountering is because of a "feature" provided by the chip responsible for producing teletext.

The line following the first CHR$141 will only be displayed if it contains a CHR$141. All other text before the CHR$141 and after the CHR$140 (end of double height text) is not displayed.

This occurs with all line pairs which are intended to produce double height text/graphics.

Unfortunately there is no way of producing the double and single height text in the way you require.

Dr Who v the Vine

THE Micropower game Dr Who clashes with the Vine Replay System and will not load with it present. Micropower says desolder a wire on the Replay ROM but Vine has a software fix which is better.

*Insert disc in drive *LOAD the !BOOT file then type ?&210E=0 followed by CALL &2000.*

This works and is better than messing about desoldering the ROM. – **I.R. Horner.**

Handling Basic

A VERY useful feature that BBC Basic does not possess is the ability to execute a Basic line that is created using a string, say lines$, while the program is running.

```
  10 PROCexecute_line
  20 REM This must be the
  30 REM 1st PROC call
  40 REM
  50 INPUT"Basic line ?"li
ne$
  60 PROCperfora(line$)
  70 END
  80 REM
  90 DEF PROCperfora(line$
)
 100 $&700=line$+":ENDPROC
"
 110 CALLtokenise_line
 120 PROCexecute_line
 130 ENDPROC
 140 REM
 150 DEF PROCexecute_line
 160 DIM Q% 20
 170 P%=Q%
 180 [OPT 0
 190 .tokenise_line
 200 LDA#0
 210 STA&37
 220 LDA#7
 230 STA&38
 240 JMP&88D3
 250 ]
 260 pointer=?&4F7*256+?&4
F6
 270 ?(pointer+15)=0
 280 ?(pointer+16)=7
 290 ENDPROC
```

This has many applications, for example, in a menu-driven program, instead of a whole list

Unfair to the Elite!

I HAVE always been a great fan of The Micro User *and have never missed an issue, despite the increase in pirate attacks on tradeships from the outer galaxy, but I was appalled, enraged and disgusted (all at once!) by your article on becoming Elite.*

I set out from Lave a year ago now, fully equipped my ship and was hot on the Constrictor's tail in a week.

Then came a brief respite as I continued my studies, but come the holidays I was back, and soon achieved Elite status, helping Agent Blake on the way.

I was the first of my friends to achieve Elite status, and I am fiercely proud of that fact. And by publishing an Elite cheat you have insulted me and all other fellow Elites.

The dictionary defines elite as "a group set apart due to certain talents". We do not want our ranks swelled by Harmless pilots who cannot even dock yet.

And by Braben and Bell, L. Varga and C. Packer, may your lasers overheat and your missiles jam, you treacherous pair of Maesinoids! – **Commander Antaeus (Elite), Wellington.**

P.S.: For those of you who prefer Thargoid bashing to Krait bashing, here's a how to get a hyperspace ambush:

- *Launch from space station (f0).*
- *Set hyperspace controls. (f5 then position using cursor keys).*
- *Freeze game (Copy).*
- *Press Ctrl +X until you hear the beep.*
- *Unfreeze the game (Delete).*
- *Hyperspace but keep your finger on Ctrl for the countdown. It works every other time, so happy hunting!*

★ ★ ★

I WOULD question some of the tactical advice on Elite given by Messrs Varga and Packer, though the insert as a whole should help strugglers a lot.

You need a combination of profitable trade and combat – repairs can be costly.

Personally, I look for a stable high tech (Level 12 or above) planet that is rich industrial – so that computers are at their cheapest – not too far away from a poor agricultural multi-government or feudal one, (anarchy systems are too hairy for beginners).

I then trade the computers (you can get to the safe zone without too much hassle) and see what price furs are – under 60cr and you'll make a profit back at the rich industrial place.

I then go out bounty hunting – simply fly away from the planet flat out until the S vanishes and head for the sun – and only hyperspace out when things get really bad.

Profit on the furs usually pays for damage repairs.

If the furs are too expensive, then provided you have the disc version, scoop up the free floating alloys – easy to tell, they're two-dimensional and there's a 40cr profit on each one.

Look at the price of platinum too. I always buy if under 70 and sell at over 70 – the price fluctuates between about 65 and 80.

One trick not mentioned helps the batteries to recover more quickly. Fly towards a planet by all means, but use a screen that shows neither it nor the sun – usually I use left or right – and the batteries will recharge a lot more quickly.

The worst experience I ever had was due to absent-mindedness. I was on my way to a system when I was beset by police, and only got to the safe zone after destroying about 30 of them.

The reason? I had a full hold of narcotics instead of computers. It took a number of hyperspace jumps and clean living to lose the fugitive status.

Finally, has anyone done more than two missions? I've roamed around all eight galaxies looking for more, but no luck so far. – **Bob Redrup, Kea, Truro.**

★ ★ ★

WHILE patrolling the galaxy last night, ridding humanity of a few miserable bandits, I was experimenting with the controls of my Cobra MkIII when I discovered a new, extremely fast method of interplanetary travel – namely the Escape Capsule.

It seems that, on my model, at least, you may locate any planet you desire anywhere in the galaxy, launch from the space station, press Escape, and the capsule will then be tracked to the chosen planet, immediately.

The only disadvantages are that no goods may be transported with you, and it will cost you 1000 Cr for a new capsule.

I believe the time saving alone far outweighs the disadvantages

for those who wish to cross the galaxy and still be back in time for tea.

I hope this hitherto undocumented information will be of use to my fellow guardians of our skies. – **Stephen Parkin, Wakefield.**

★ ★ ★

I MUST inform you how helpful your guide to playing Elite was.

I have progressed gradually through from Harmless to Dangerous. Now here are some hints for Superior Software's new game, Citadel.

To appease the wolf guardians in the temple you must get the chicken from the freezer, cook it in the kitchen and go to the temple.

To get in to the witches' house, take the trampoline from the temple and drop it outside. Bounce on it to the roof and go down the chimney.

Take your time on the screens and plan your moves. If you collect an energy flask this will boost your energy up 30 units.

You can fill the bucket (which is green) with water at the ocean. This will put out flames. Try it at the East Fireplace and go up the chimney. – **David C. Footlitt, Retford.**

of IF user_option$="so_&_so" THEN PROCso_&_so, you can substitute line$="PROC"+user_option$ and then execute line$ directly.

Other applications include new languages which use Basic as a building block.

In the Basic I listing line$ is INPUT by the user, line 50, at run time and PROCperform(line$), line 60, performs the execution. The only condition is that the first procedure call must be PROCexecute_line, line 10.

PROCexecute_line first loads a small tokenising assembler routine and then changes its own procedure call pointer so that subsequent calls of PROCexecute_line will be redirected to location &700.

At line 100 line$ + ":ENDPROC" is stored from location &700 (free during run time). It is then tokenised or compacted (line 110) using a Basic I ROM routine at &88D3. The Basic II routine can be found at memory location &8951.

Next a call to PROCexecute_line is redirected to &700 where line$ + ":ENDPROC" is executed.

The method is a bit messy and would be better incorporated into BBC Basic. – **J. Middlemas, Felmersham, Bedford.**

Poor old Bob

I AM worried about Bob. He seems to be suffering so many traumas these days that I hope he doesn't seize and have to press Break on our sharing his

→

From Page 155

experiences.

However I can understand his feeling aggrieved because Trev never replies, and this must be very frustrating.

Of course most of us will have some idea of how he must feel when we correspond with hardware suppliers or software houses about their products.

My own experiences in this way would fill a book, but they would be nowhere near as entertaining as Bob's.

"I agree", says my wife, who is just as tolerant as Andrea and definitely one of Bob's fans but equally not a computer buff.

Keep going Bob – you may get a reply one day – and a big vote in the current survey. – **Tony Lawrance, Wigston.**

Repton rapture

WHAT a marvellously entertaining game Repton 2 is, beginning as it does with a cunning ploy enticing you into

And finally, with tongue firmly in cheek . . .

Please burn before reading

Dear Trev,

At last I can tell all! It all began just before Christmas when I got a phone call from the Beeb team.

"Is that you, Wally? Great. Now listen, carefully. Acorn are bringing out a new machine and me and the lads have been invited down to the Dream Factory for a preview. So pick us up tomorrow and don't forget to bring Andrea".

With that the phone crashed down and I was left wondering what Acorn's new machine was. Considering they'd followed the Beeb with an Electron I expected something like the ZX81. And I also wondered why they wanted me. And A.

I won't describe the journey down, though I must admit that I never knew there were so many real ale pubs just off the A1. And Andrea exhibited a previously unseen talent for opening cans of beer without the explosions of spray that greeted the Beeb team's efforts.

Anyway, I had no difficulty finding the route back, I just followed the empties. I dread to think what effect this had on A.'s nephew Nigel, who had come with us as it was A.'s turn to Nigel sit.

Actually I wonder what effect Nigel had on the Beeb team. He's got a bad case of adolescence, spots and all. And he's gone punk. With his hair set in green, yellow and violet spikes he sat on the back seat wearing his "Electron users do it slowly" tee shirt looking like nothing so much as a peacock that's just had a very nasty shock.

So it was a fairly motley crew that arrived at the Dream Factory to be greeted by the PR man. He looked like something out of a NEXT window and the Beeb team had a lot of fun on the way back trying to decide exactly what PR stood for in his case.

"Hi", he breathed, "my name's Euge, but you can't tell anybody that until we say you can and even then we might sue you, so there".

Having said that Eugene ("Call me Euge, everybody does") thrust a bundle of documents in our hands. "Sign these".

"What are they?" asked A. who won't sign anything until she's read it. You'll probably remember how she read the register at the wedding before she signed.

"They're non-disclosure agreements. We can't let you read them until you've signed, otherwise you might tell. We don't like people who tell", he said looking straight at me.

The document went something like this: You can't tell anyone anything you learn about anything here until we tell you you can which we probably won't. And you can't tell anyone about having signed this. So there. Eat this after signing.

Surprisingly enough everyone signed. Of course Nigel had to do it in blood, which had Eugene out for the count.

"The old red ink trick never fails. Pity I didn't bring my pet rat".

"It's a pity you brought yours", seethed Eugene to me as we made our way to the holy of holies.

We entered a darkened room (it was noticeable how everyone shied away from Nigel) and there on a spotlighted table was a spanking brand new first-one-off-the-production-line BBC Master.

"Ladies and gentlemen", Eugene proclaimed, quivering with pride, "our latest product".

"You're going into furniture", squealed A., "It's lovely but that nasty micro clashes with it".

"The micro is our new product, the basis of a series of five upwardly compatible micros. It's our Master piece".

"Does the table come with it?" A. persisted.

"It's got a hump", yelled Nigel, who really shouldn't be casting stones. "Do you call it Quasimodo?"

"The hump is for all the electrical gubbins. You know, chips and that sort of thing. I think it's quite fetching". I wonder if NEXT will be flogging the Master series.

"Can we have hands on experience?"

"Yes but only if you wash them and wear gloves".

"What about a mask?" I asked sarcastically.

"I thought you were already wearing one", came the retort.

A. decided to change the subject. "It's got a hole next to its hump".

"That hole as you call it is two cartridge slots allowing you to add ROMs".

"Just like I've got on my Electron", exclaimed Nigel.

"Why should you want to add ROMs, have you left some out?" A. added.

"No we haven't", screamed Eugene, who by this time was looking a bit desperate. "In fact we've put in all sorts of bundled software. It's got View and Viewsheet. That should screw up your Mini-Office". This last was said with a nasty glance at the Beeb team, who were gathered round the Master, laughing.

"Have you used View?" they asked, which answer seemed to quieten Eugene for a while. After that they kept referring to the bungled software.

"What's the filing system?" I asked, more to break the silence than anything else.

"It's got two, the 1770 DFS and the ADFS".

"Just like my Electron", Nigel got in just before Andrea's "Why two? Is it in case one doesn't work?"

I'll draw a veil over the rest of the proceedings. They mostly consisted of the Beeb team asking technical questions like: "Is the off/on switch still in the most awkward place?" and "Can we play Elite on it?"

And it still hurts to think of why they brought me. Eugene had just got to the point where he said that putting in the expansion cards was foolproof.

"Go on then Bob, prove him wrong", they said shoving me forward.

What puzzled me most was why they had specifically asked for Andrea. As we left to the accompaniment of Eugene's "Don't forget that you haven't been here and you haven't seen anything and if you did it wasn't me who told you", I asked one of the team why they'd wanted A.

"Because of her bellringing expertise".

"What's that got to do with the new Beeb?"

"Well you heard Eugene, didn't you? It goes like the clappers".

Cheers,

Bob

PS: I did not write this letter.

the game with splendid advertising and rapturous reviews.

Once hooked, you must wend your way to the nearest stockist, dig deep, and come up with the readies.

The plot then moves into B+ territory where the monster on emerging from a fallen egg, crashes out of the program! – **Chris Bell, Ripon.**

● Superior Software tell us that this problem has been solved and all new batches of Repton 2 are compatible with the model B+.

If you return your copy to them they will replace it by return of post.

Volex leads

CONCERNING the article by Robin Nixon on the Volex 2000B teletext adapter in the January issue of The Micro User. *Could you tell me whether or not it requires input leads other than the 1MHz bus?* **D.A. Shepherd, Halversham, Milton Keynes.**

● The Volex 2000B comes with its own external mains power supply which plugs into the back. No other leads are required.

No Revs

I WOULD like to point out to your readers the fact that four track Revs will not work with Basic I BBC Micros.

As soon as the game has requested the track choice the micro returns Syntax error. I hope this warning is useful to other Basic I micro owners. – **P. Ashcroft, Cambridge.**

● Thanks for your warning. We've contacted Acornsoft and they say if you return the original disc they will upgrade (downgrade) it so that it will work with Basic I.

I ENCLOSE a poem which my 13 year old son Tim wrote for a local Sunday School competition. Incidentally, he came second in the competition. – **Mrs C.J. Mason, Newcastle, Staffs.**

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Sometimes I sit and play all day,
Until my eyes grow dim,
But when my Dad returns from work,
My computer belongs to him!

Ed:
Playing games is fun we know
And later when to bed you go
Father needs to play them more
Dads are lads but that bit slower!

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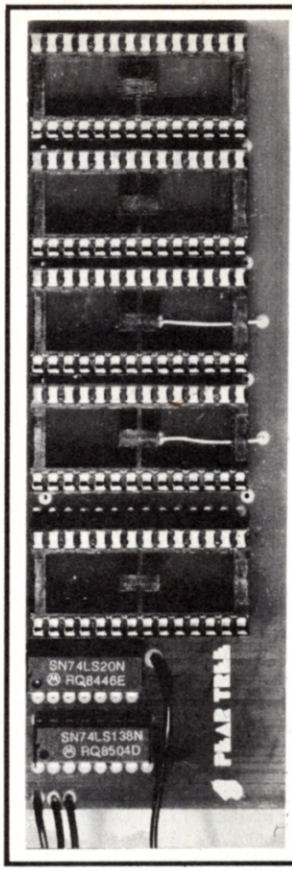

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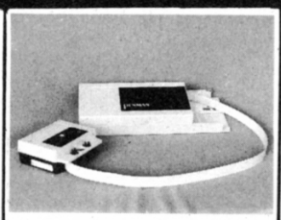

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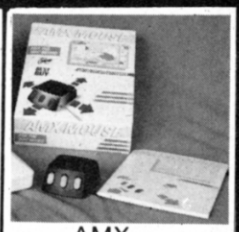

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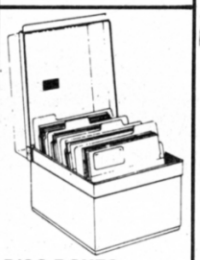

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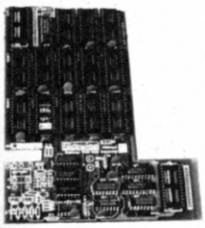

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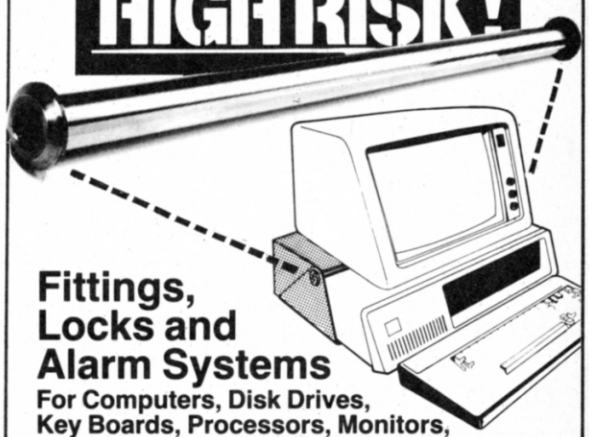

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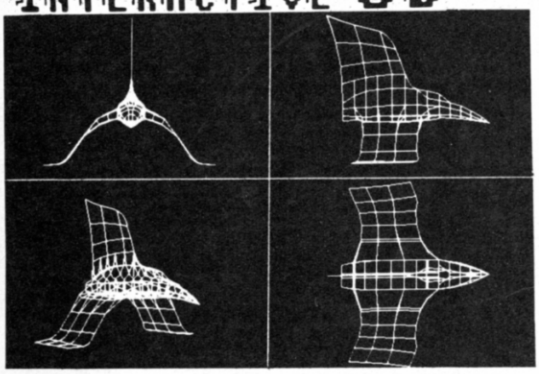

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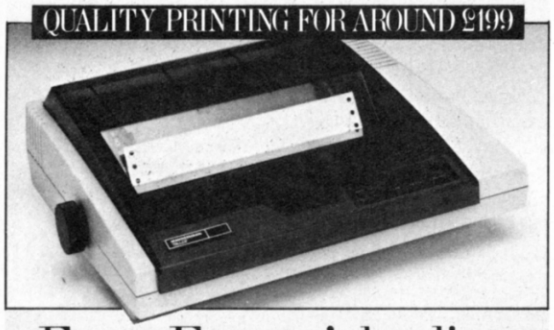

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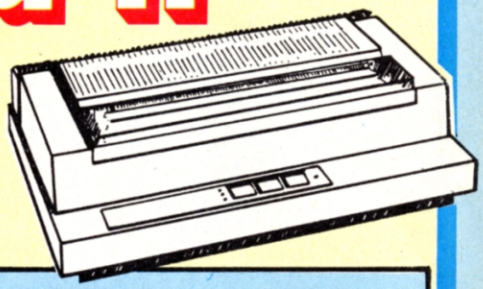
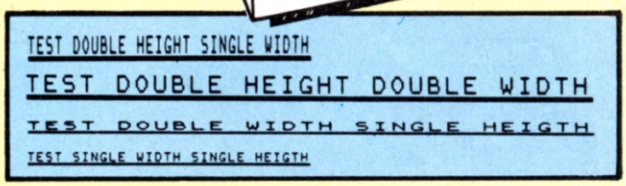


There's never been an offer like this – the Olivetti dry ink-jet printer at an incredibly low price



When it was launched two years ago this Olivetti printer broke new ground by introducing spark ink-jet technology. One big advantage was that it reduced the number of moving parts. The ink – a compressed solid, not liquid – is fired at the paper by an electrical discharge. Printing is bi-directional, and characters can be normal size, double height, double width or underlined. Images can be revised (to give a negative picture), or you can use a zoom effect to double the size of the picture. Maximum speed is 120 characters a second, or 50 full lines a minute. While its performance cannot be compared to more modern NLQ dot-matrix printers, it is ideal for listings and personal correspondence, and it produces superb graphics dumps.

The package includes the printer, BBC Micro interface, replacement ink cartridges and detailed operating manual.

ONLY AVAILABLE WHILE STOCKS LAST

ONLY £59!
incl. VAT, p&p

Acorn User had this to say about the Olivetti dry ink-jet printer in May, 1983:

'Its big advantage is that the dots are very small which means superb graphics printing – I doubt whether any other printer can rival the resolution. It prints 110 dots per inch in the horizontal direction, and an amazing 220 vertically. The picture of the film star's face (Marilyn Monroe or Jean Harlow?) beloved of printer adverts can be reproduced in amazing detail on a rectangle less than two and a half by two inches.'

When that review was written the printer was selling for £360. Now, with this Micro User offer, you can get it for ONE-SEVENTH of its original price!

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9 FULL LENGTH programs designed to stimulate, educate and entertain – both in school and at home

The Micro User Education Special Volume I has now sold out But Volume 2 is still available

It contains nine full length programs written to the highest standards and each picked to combine educational worth with sheer enjoyment. The nine programs cover topics from early reading and simple sums to the rules of punctuation and angle estimation – and there's an excellent introductory database.

The magazine contains the complete listings of all the programs together with advice on how they can be adapted to cater for individual needs.

Fun Factors: *Arcade style factor learning.* ***Windmill:*** *Word, number and colour recognition.* ***Angler:*** *Angle estimation fun.* ***Spelldroid:*** *Learn to spell with our friendly robot.* ***Tortal:*** *Teach and test the rules of simple addition.* ***Discovery:*** *A strategy based phrase identification game.* ***Punctuation:*** *Test and teach the rules of punctuation.* ***Junior Database:*** *A comprehensive database for the young learner.* ***Chinese Takeaway:*** *Teach and test the rules of simple subtraction.*

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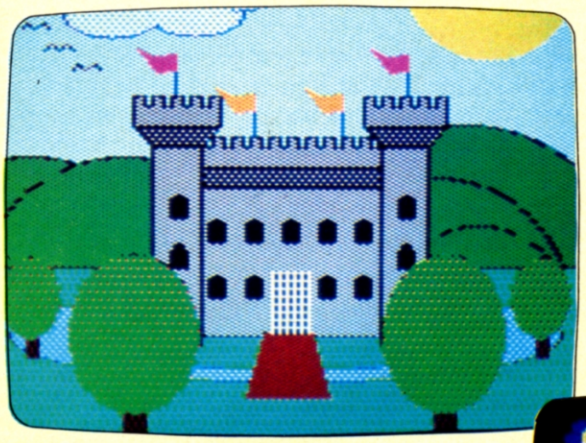

Acornsoft's Graphics Extension ROM sets new standards in graphics power and flexibility.

An official product, totally integrated with the operating system, GXR gives the BBC Micro the graphics capability it was designed for.

The 16k ROM provides a wide range of geometric shapes: rectangles, parallelograms, circles, ellipses, arcs, sectors and segments.

In fact there are over 100 different PLOT codes to enhance your micro's displays. As well as superb flood-fill routines – including user-defined patterns – there are dot, dash lines, copy screen sections and a host of other options.

The ROM even incorporates its own sprite routines, giving your programs that machine code feel from Basic.

Powerful, yet easy to implement, GXR makes the BBC Micro the leader in the field of microcomputer graphics.

"If you're wondering what your next upgrade for your BBC Micro should be, look no further".

Micro User, September 1985

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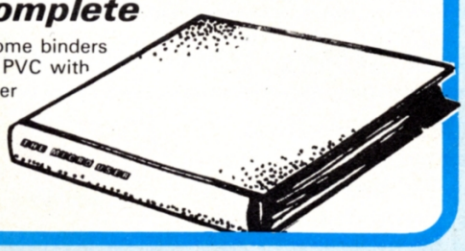

Your BBC Micro needs protecting!

Our luxury dust cover is made of soft pliable water-resistant transparent vinyl, bound with strong cotton and decorated with the *Micro User* logo in black.

Use the special order form on Page 9 – No stamp needed!

THE MICRO USER MAIL ORDER OFFERS

Tune your BBC Micro to receive BBC Ceefax and ITV Oracle pages with the BBC Micro Teletext System

Teletext is claimed to be the fastest growing communications medium in Britain. And no wonder! From share prices to football results, from recipes to free telesoftware, many thousands of pages are being continuously broadcast and updated by the BBC and ITV.

There are 3 million teletext TV sets in Britain, and the number is growing by another 50,000 a month. But if you have a BBC Micro all these pages are available to you without going to the expense of buying an expensive TV set.

All you need is the BBC Micro Teletext System, which decodes the broadcast signal and feeds teletext pages into your normal TV set or monitor.

But your BBC Micro can do more than just display the pages. You can store them in memory, transfer them to tape or disc and display them again in any order you like.

When this package was first reviewed in The Micro User *in February 1984 we described it as being "nice and easy" to operate, but added: "At £225 it's a bit expensive for the home user, especially as there doesn't seem to be much telesoftware available . . ."*

TODAY there's plenty of telesoftware – games, utilities and educational programs – and it's all free. And what's even more impressive is that the price has dropped – DRAMATICALLY!

Never before offered at such a low, low price!

The BBC Micro Telextext System includes a Teletext Adapter, a Teletext ROM and a 73 page manual, including a detailed 24 page guide to how teletext works.

£69.95
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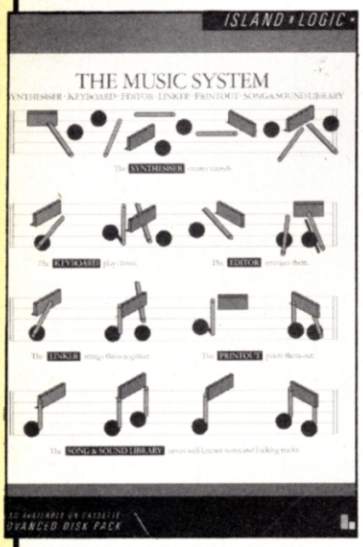

If you're used to musical notation, or simply typing in from manuscript, **The Music System** is the one for you. Its superb screen presentation – the note sequencer taking the form of a four-track tape recorder – makes it a joy to use. And the ability it gives you to interactively edit the matched pitch and amplitude graphs takes all the difficulty out of the ENVELOPE command.

2 cassette pack **£25.45**

Disc **£25.45**

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Give your Acorn Speech Processor the company it's been longing for – the amazing **SpeechRom** from Computer Concepts.

This power-packed ROM will allow you to fully exploit the tremendous potential of the Acorn speech processor chip. It allows you to:

- Create any word or part word.
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- Add pitch to sounds.
- Use it from both Basic and machine code.

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And if you haven't got a speech processor yet, you've still got chance to take advantage of our low cost offer on the official Acorn speech processor upgrade. This features:

- 164 words and word parts from which you can construct your own new sounds with ease. (No such limitations with SpeechRom fitted.)
- Simple to use from Basic using the SOUND command.
- Two chips – quick and easy to install.
- Suitable for all BBC Micros, with version 4 boards or later.
- A decent British accent.

SpeechRom £29.35 **Speech Processor £29.95**

Buy both for £55.45 (save an extra £3.85)

Upgrade to Basic II for a very special price!

Big saving! – only **£23.50**

This is what you get with Basic II:

- More accurate calculations.
- An extra file handling command, OPENUP.
- The invaluable OSCLI command, allowing you, for example, to *LOAD files with a variable as the file parameter.
- EVAL will work with PAGE, HIMEM and other pseudo-variables.
- The INSTRing bug has been corrected.
- More efficient handling of string memory.
- EQUB, EQUD and EQUW – invaluable in assembler.
- O% combined with extra values of OPT to enable offset assembly.

Don't miss this exceptional offer

The Advanced User Guide *is the essential companion for the BBC Micro . . . with 512 information-packed pages*

Featured are:

★ the BASIC Assembler
★ 6502 machine code reference section
★ complete descriptions of all FX calls
★ BBC memory usage and vectors explained
★ full interfacing details for the user port, tube, analogue port, 1 MHz bus
★ paged ROMs explained ★ and lots, lots more.

With many examples to illustrate the text, this guide is the indispensable reference work for the serious BBC Micro programmer. **£11.50**

Use the special order form on Page 9 – No stamp needed!

THE MICRO USER MAIL ORDER OFFERS

To celebrate our third birthday we're offering back numbers, tapes and discs at really ridiculous prices!

You can choose from these issues

MARCH 1983: Deathwatch, Bingo and other programs.
APRIL: King Kong, Nim, and other programs.
MAY: Air Strike, Pelmanism, Anagrams, and other programs.
JUNE: Space Pilot, Nomism, and other programs.
JULY: Tenpin, Spacepods, and other programs.
AUGUST: Fruities, Animation, and other programs.
SEPTEMBER: Robin & Marian, Galactic Invaders and other programs.
OCTOBER: Fishing, Joykey and other programs.
NOVEMBER: Goblins, Blackjack and other programs.
DECEMBER: Tower, Santa, and other programs.
JANUARY 1984: Barrels, Noteplay and other programs.
FEBRUARY: Invasion, Frogs and other programs.
MARCH: Mazemunch, Birthday and other programs.
APRIL: Microgolf, and other programs.
MAY: Dug Dig, and other programs.
JUNE: Roadracer, 3D action. **Quadline,** four-in-a-line. **Monitor,** debugging routines. **Toolkit,** 8271 explored. **Areas,** easy maths. **Spell,** spelling education.
JULY: Doomrun, deep space drama. **Backgammon,** the board game. **Keys,** user defined key editor. **Save?** and **Tidisk,** disc utilities. **Alice1** and **Alice2,** mini-adventures. **Terminal1** and **Terminal2,** communication programs. **Acoustic,** software and Body Build Modem.
AUGUST: Castle, enthralling adventure. **Gridman,** a high speed strategy. **Tedit,** Teletext editor. **Dsquare,** number fun. **Dedit,** disc editor. **Input,** the ultimate input routine. **Bells,** Alice's mini-adventure.
SEPTEMBER: Villains, save your crystals. **Rollerball,** game of strategy. **Microterm,** comms terminal. **T/Textdump,** Mode 7 screen dump. **Numbersign,** number skills.
OCTOBER: Wampus, explore the labyrinth. **Balloon,** escape the Goulogs. **Splits,** split screen utility. **Pageram,** paged RAM programs. **Input1/2,** inputs for the disabled. **Morecol,** extended colours. **D/A,** waveform generator. **Integer,** direct addressing speed.
NOVEMBER: Buster, line up the diamond blocks. **Duel,** two player action. **Seaside,** picture fun for the young. **M7letters,** teletext large letters. **Dsceload,** loading disc files to &E00. **6502,** second processor programs. **Synth,** musical Body Building programs.
DECEMBER: Painter, paint the pyramid. **Miner,** delve into the depths. **Snowvad** and **Carol,** seasonal programs. **Garden,** shape-matching. **Medit,** memory editor. **Catalog** and **Save,** disc utilities. **Ladders,** mini-adventure. ***Plus Omega Probe – a machine code game.***
JANUARY 1985: Rover, guide our retriever. **Backgammon,** two player version. **Matchwood,** shape recognition. **Messages,** machine code printing. **Speedtext,** display text at different rates. **Search,** a powerful tool. **Second processor,** Body Building and graphics routines. ***Plus Galactic Tycoon, our superb free game.***
FEBRUARY: Helicopter Dogfight, two player action. **Craal,** dungeon adventure. **Pilot,** the language. **Riddle,** first Pilot program. **Disdump,** the ultimate disassembler. **Talker,** speech chip utility. **Change,** program tidier. **In/out** – output from assembler. ***Plus Atomic Protector – a machine code game.***

To mark our third birthday, and to welcome newcomers of the BBC Micro, many of whom will be reading *The Micro User* for the first time, we have some extra-special offers – back numbers of the magazine, tapes and discs – to help you catch up on all the good things you may have missed.

TAKE YOUR CHOICE from issues between March 1983 and February 1985 (except 8/83, 1/84 and 3/84).

	Mag only	Mag+ tape	Mag+ 5¼" disc	Mag+ 3" disc
Any 6	£4.50	£19.50	£28.00	£34.00
Any 12	£8.70	£38.00	£56.00	£64.00

Any 5 ..... Tapes £12.50; 5¼" discs £20; 3" discs £25

TAKE POT LUCK

Assorted tapes: ..... 10 for £10; 20 for £16
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***These bargain bundles are only available to the end of March! This is your last opportunity to purchase back issues, tapes and discs from the first two years of* The Micro User.**

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MARCH: Astromines, space action. **Castle,** two player catapult battle. **Data Maker,** take the tedium out of entering Data. **Disc Search,** string search utility. **Command,** give your BBC and Epson printer the same character set. **Break Key,** disable Break. ***Plus Flex – a machine code game.***
APRIL: X15, sideways-scrolling spectacular. **Mornington Crescent,** fun on the London underground. **Calculator,** AMX mouse mathematics. **Dithering,** colour mixer. **Chatterbox,** speech chip procedures. ***Plus Rabbit Run – a machine code game.***
MAY: Stellar Rescue, arcade action. **Dominoes,** simulation. **Plot69,** fast Mode 2 plot routine. **Musical Events,** a music interrupt utility. **Pound and Hash,** an Epson printer routine. **Sheila,** micro slide show.
JUNE: Othello, simulation. **Activities,** word association. **Catnap,** arcade enjoyment. **Simon Quackers,** lightpen game. **Shape recognition,** teach your micro to identify. **Stripper,** a routine for removing line numbers. **Epson,** a type-setting utility. **Lprint,** simplifies string output. **Eval,** the Basic command from machine code.
JULY: Fly, an arcade spectacular. **Draughts,** a superb version. **Compox,** 3D noughts and crosses. **Double Height,** large characters in Modes 0-6. **Clock,** alarm utility. **Compacter,** compress Mode 2. **Inside Basic,** basic routines in machine code. **RAMpage and RAMsave,** sideways RAM utilities. **Video,** graphics to music.
AUGUST: Harbour Command, protect a Cornish town. **Fruit Machine,** a gambler's favourite. **Mouse Organ, AMX** mouse music utility. **Flash,** alternative flashing colours. **String Formatter,** prevent end of line word splitting. **M/C Games,** random number and key detection routines.
SEPTEMBER: Ball Lightning, tame the lightning. **Quarters,** game of skill. **6502 Games,** a simple arcade game. **Variable Lister,** track your variables. **Smiley Hunt,** Al's game. **Error handling,** the vital routines.
OCTOBER: Karate, superb martial art action. **Solitaire,** all-time favourite. **Scroller,** text scroll utility. **Case,** an ON PROC command. **Disc Scan,** search for disc files. **Adventure,** avoid the vampire.
NOVEMBER: Whodunnit, solve the murder. **Gloop Gulp,** zany arcade action. **Basic Analyser,** take the drudgery of debugging. **Wordwise F/keys,** get the most from your word processor. **Sideways,** sideways screen clear. **New Modes,** Modes 8, 9 and 10. **Disabler,** prevent star command clashes.
DECEMBER: Wizard's Castle, recover a diamond from the necromancer's lair. **Squares,** 'join the dots' strategy. **McBase,** powerful database. **Alphabet Train,** early spelling. **Basic Analyser,** the vital cross reference tables. **Wordsquare Creator,** to create your own puzzles. **Dumper,** how your programs affect memory. **Subhunt,** the final listing. ***Plus the listings from Body Building and Adventures.***
JANUARY 1986: Megaroids, exciting space action. **Claustrophobia,** alone in a maze. Can you get out of the maze in one piece? **Fives,** mind bending noughts and crosses. **Music Editor,** translate musical notation. **Wordsquare Solver,** the program to help you solve them. **Find and replace,** find and replace any item of text in a Basic listing. **Discopy,** copy and/or rename files. **S-sound,** sounds into electronic effects. **Alice,** another baffling problem.
FEBRUARY: Tipaka, can you escape the Logan King's castle in one piece? **USS Endeavour,** fast and exciting space invader action, and it's in machine code. **Ploy,** hours of enjoyment with this brain teasing strategy game. **Up-and-downloader,** an invaluable programming aid for loading and saving. **Fast Verify,** a superb utility for verifying saved disc files. **Disc Assembler,** assemble multi-part source files to disc. **Shift and Echo,** more electronic effects from the Body Building course. **8271,** using OSWORD to format a disc in a special way.
MARCH: Morris Miner, collect the keys and escape the mine before your time runs out in this levels and ladders spectacular. **Poster Puzzler,** a sliding block simulation to provide hours of fun for the whole family. **Quicksort,** a fast machine code sort routine that uses and teaches recursion. **Character Sets,** a program to create and display your own fonts. **8271,** four programs to complement the last article in the series. **Sound Sampler,** two programs from the Body Building course. **Eleusis,** another mind bending puzzle from Alice.

Save wear on your fingers and ensure all your programs are error-free by using our monthly tapes or discs. They are only:

£4.25 cassette
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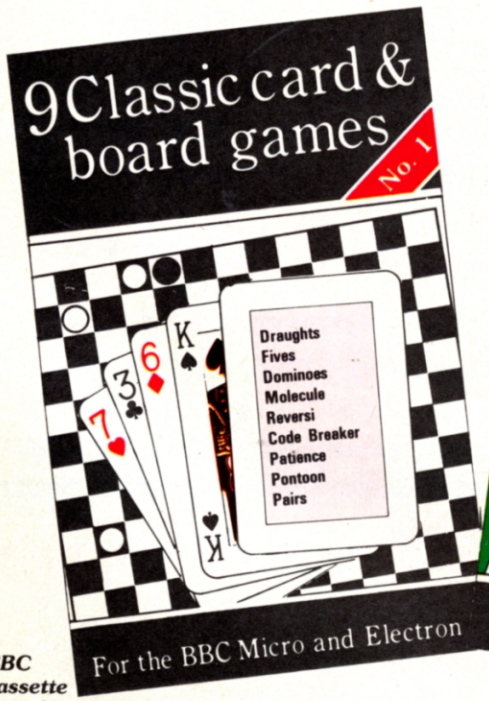

BBC cassette can also be used on the Electron

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THE MICRO USER

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Commence with ..... issue

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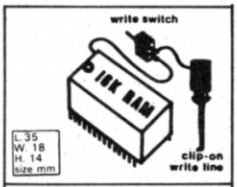

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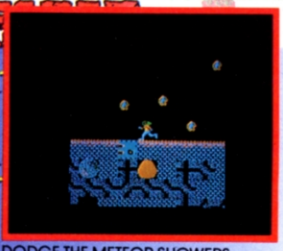

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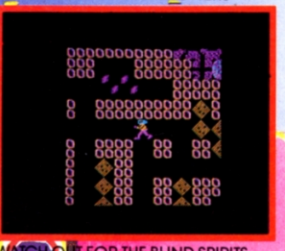

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